SERV. 6439

Canovision 8

SERVICE MANUAL

MC-4B

MECHANICAL CHASSIS

NTSC

PAL

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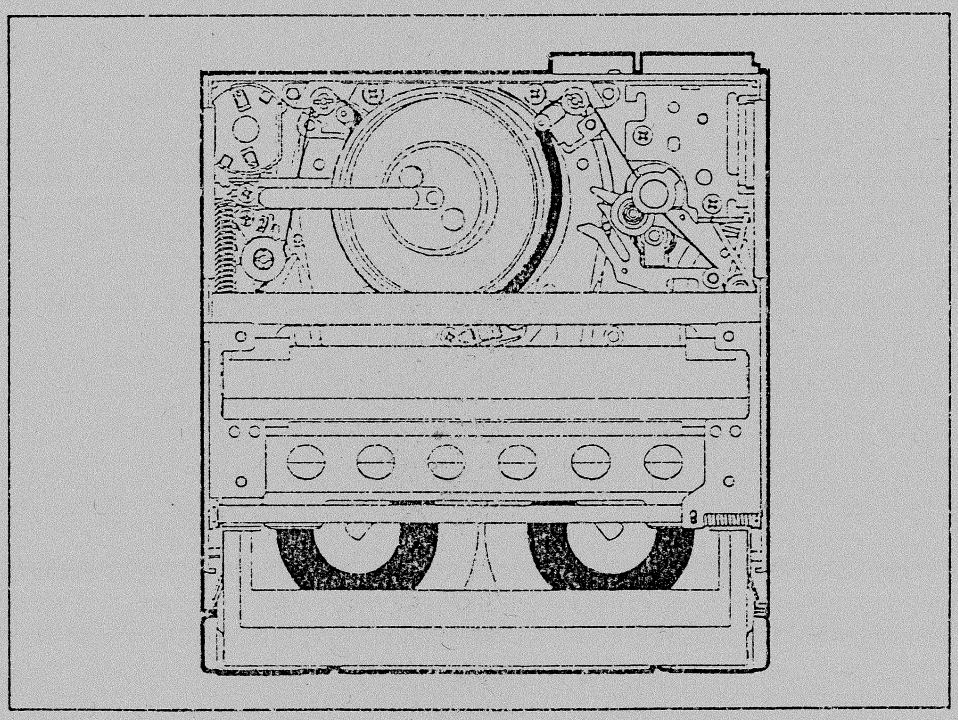

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Chapter 1 Operations

1.Main Parts in Mechanical Section

1-1 Locations and Nomenclatures

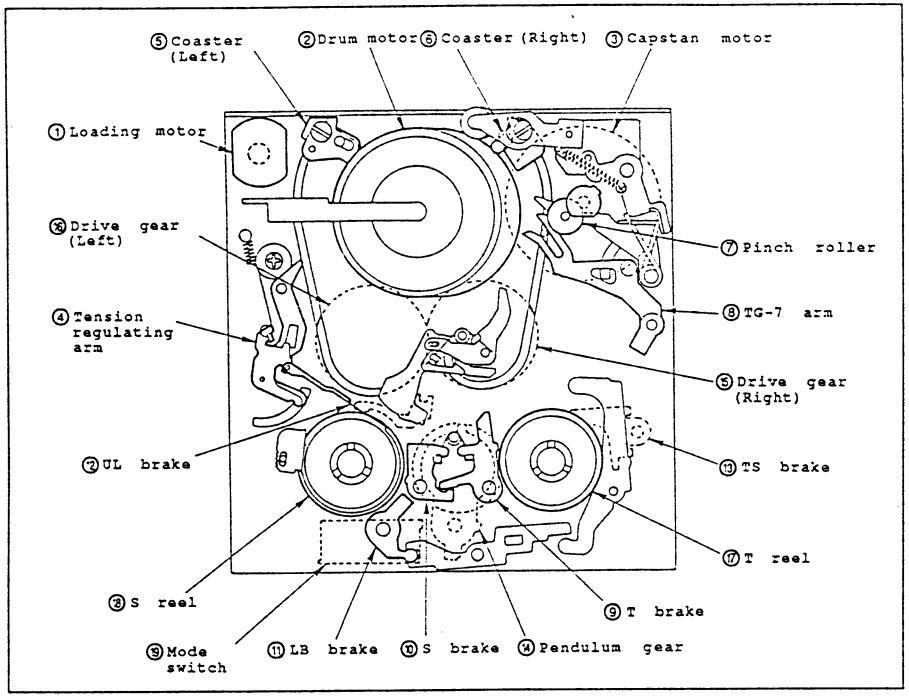


Fig.I-1

1-2 Relationships between Each Mode and Mode Switch

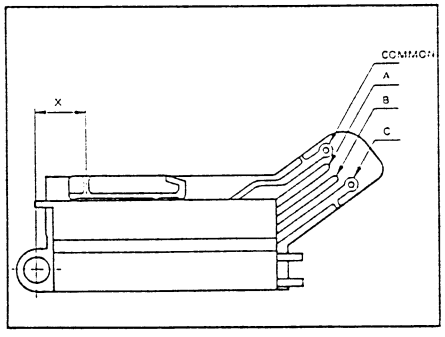


Fig.I-2

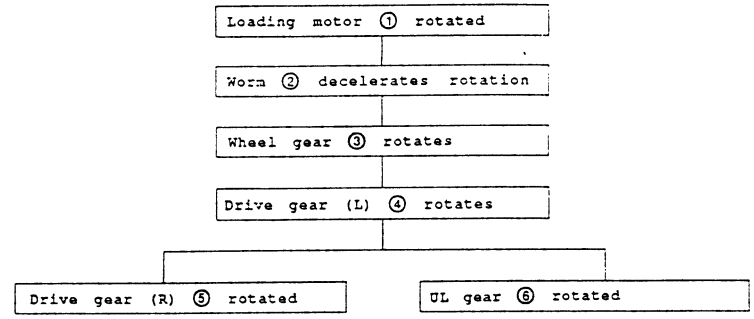
Modes	X (mm)	A	B	C
Eject	1.7-2.7	opened	opened	shorted
Blank	2.7-5.7	opened	opened	opened
Load/Unload	5.7-6.7	opened	shorted	shorted
Blank	6.7-8.1	opened	shorted	opened
Stop	8.1-9.1	shorted	shorted	opened
Blank	9.1-12.0	shorted	opened	opened
Play	12.0-13.3	shorted	opened	shorted

Table I-1

Note: "Opened" and "Shorted" in the table is versus the COMMON.

2.Operation in Each Section

2-1 Gear Train


Loading motor ① rotated
Worm ② decelerates rotation
Wheel gear ③ rotates
Drive gear (L) ④ rotates
Drive gear (R) ⑤ rotated
UL gear ⑥ rotated

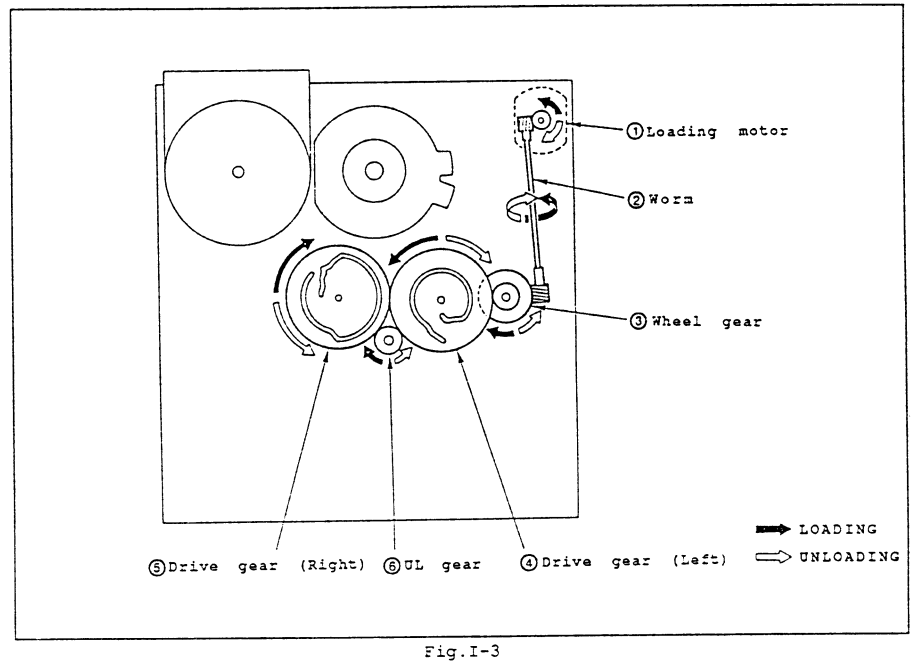
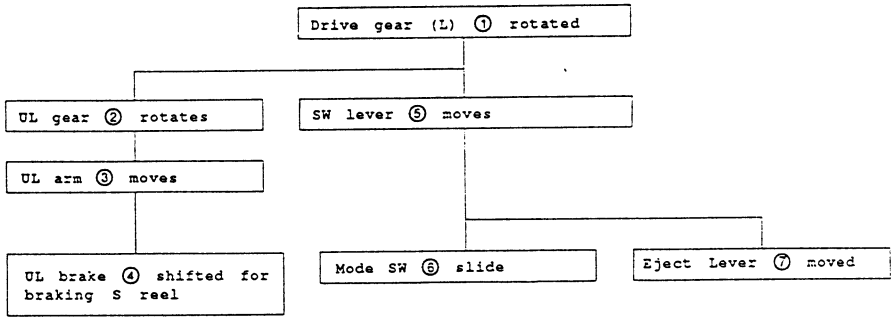


Fig.I-3

2-2 Mode SW, Eject Lever, UL Brake


Drive gear (L) ① rotated
UL gear ② rotates
SW lever ⑤ moves
UL arm ③ moves
UL brake ④ shifted for braking S reel
Mode SW ⑥ slide
Eject Lever ⑦ moved

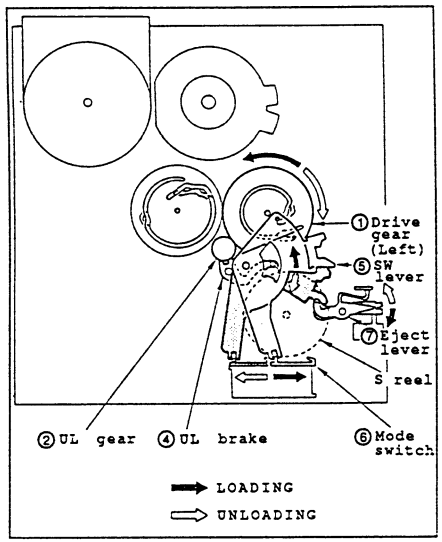


Fig.I-4

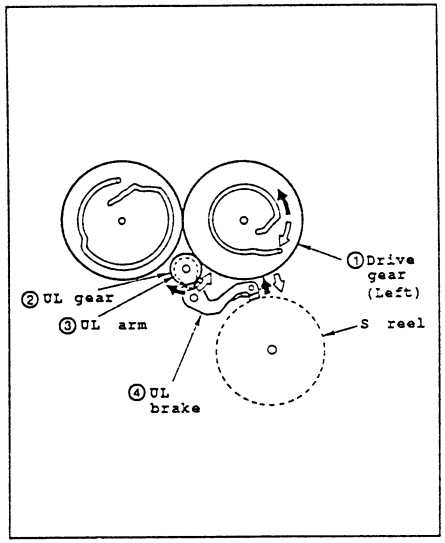
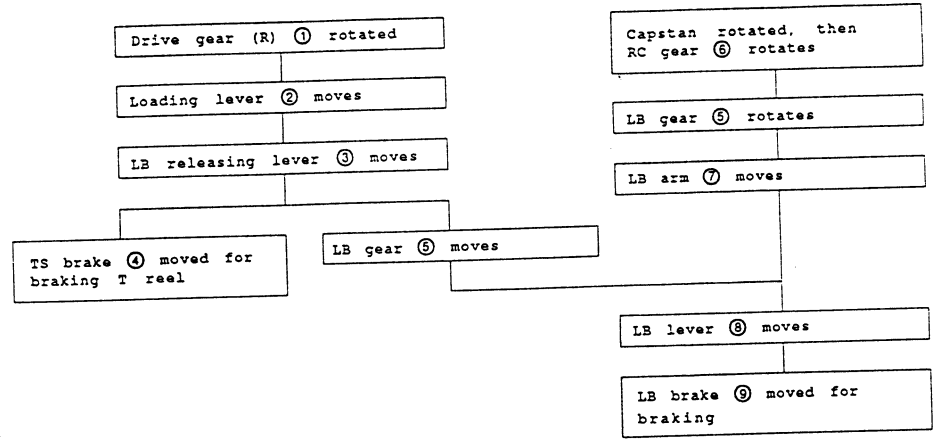


Fig.I-5

2-3 TS Brake, LB Brake


Drive gear (R) ① rotated
Loading lever ② moves
LB releasing lever ③ moves
TS brake ④ moved for braking T reel
LB gear ⑤ moves
Capstan rotated, then RC gear ⑥ rotates
LB gear ⑤ rotates
LB arm ⑦ moves
LB lever ⑧ moves
LB brake ⑨ moved for braking

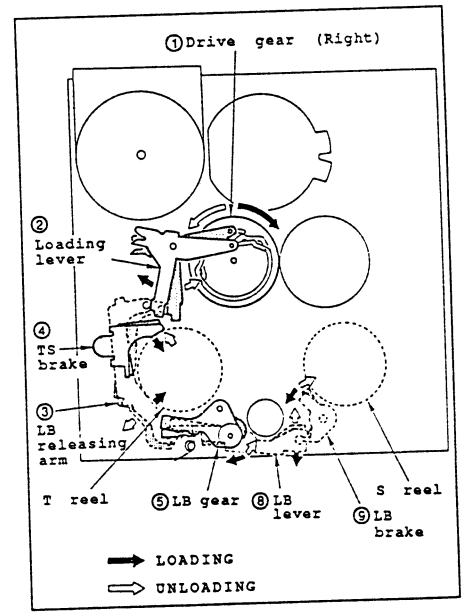


Fig. I-6

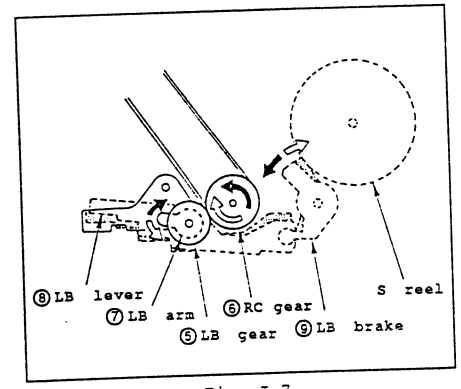


Fig. I-7

2-4 T Brake, S Brake

Drive gear (R) ① rotated

↓

Brake releasing arm ③ moves along cam ②

↓

T brake ④ moves for releasing T reel breaking

↓

S brake ⑤ moved for releasing S reel breaking

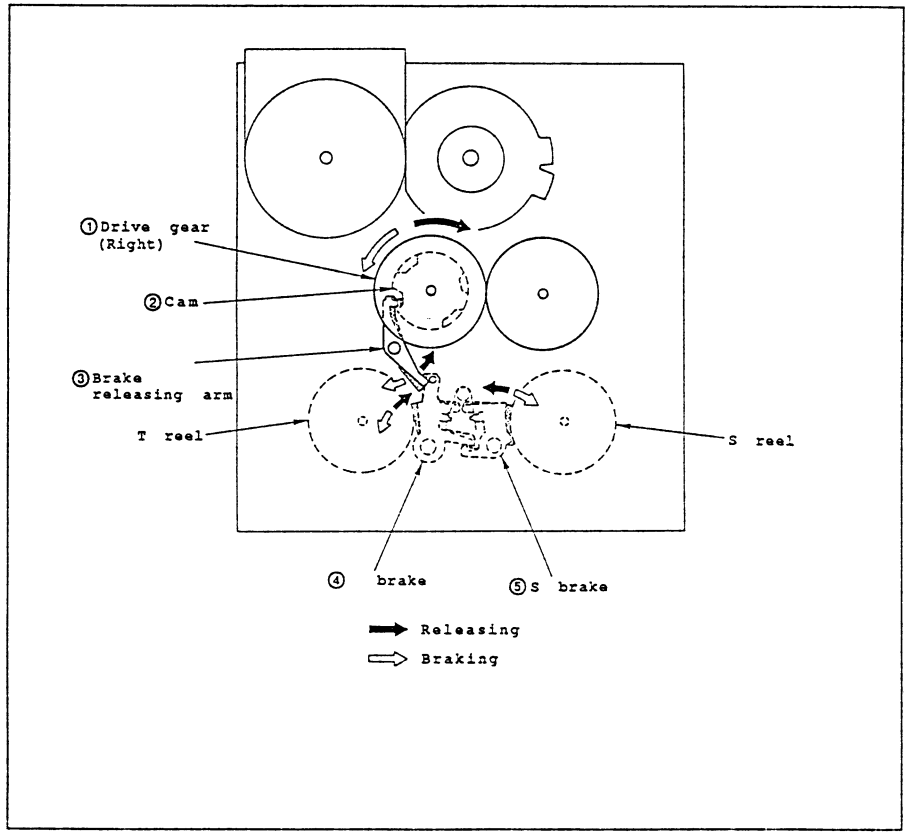


Fig. I-8

2-5 Tension Regulator Arm, Pinch Arm (Pinch Roller)

Drive gear (L) ① rotated

↓

SW lever ② moves

↓

Tens reg. arm ③ moves

Drive gear ④ rotates

↓

Loading lever ⑤ moves

↓

Pinch sub arm ⑥ moves

↓

Pinch arm (Pinch roller) ⑦ pressed onto capstan

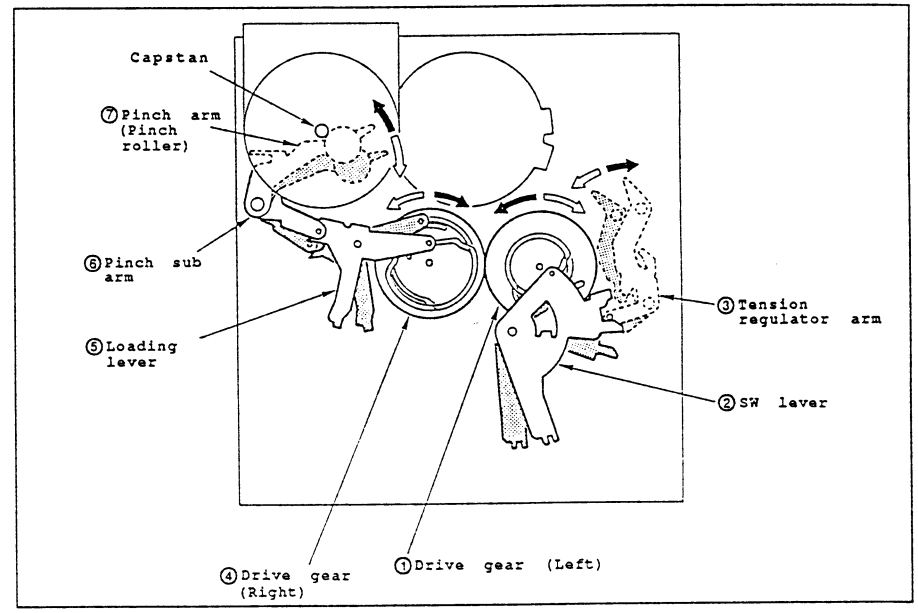


Fig. I-9

2-6 Coasters (Right/Left)

Loading motor ① rotated

Worm ② decelerates rotation

Wheel gear ③ rotates

Drive gear (L) ④ rotates

Drive gear (R) ⑥ rotates

Coaster (L) ⑤ moves

Coaster (R) ⑦ moved

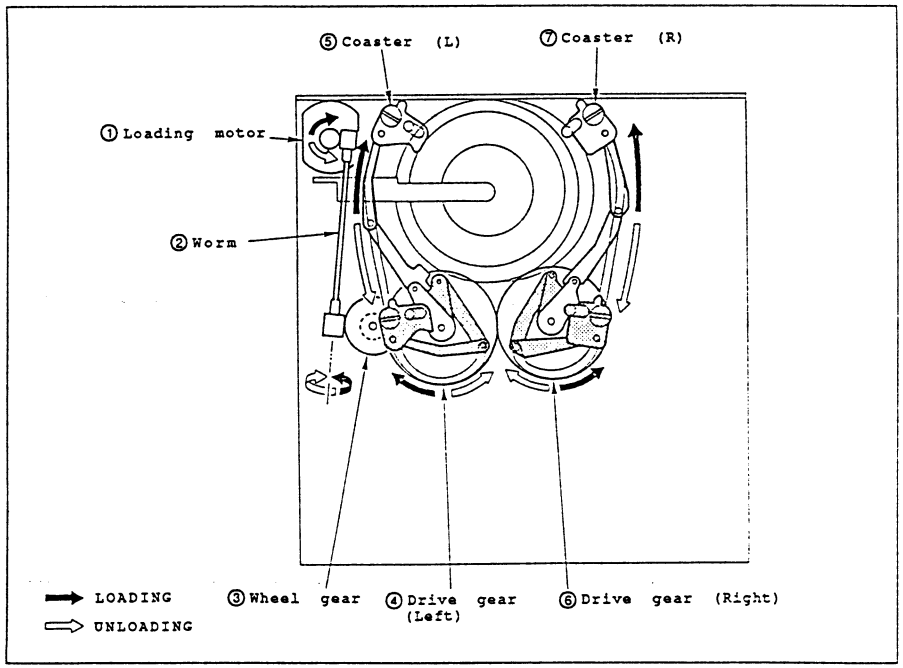


Fig. I-10

2-7 Reel Tables (Take-up/Supply)

Capstan ① rotated

Joint gear ② rotates

Timing belt (S) ③, Relay pully ④ and timing belt (L) ⑤ rotate

RC gear ⑥ rotates to mesh Pendulum gear ⑦ with T reel ⑧ or S reel ⑨

T reel ⑧ or S reel ⑨ rotated

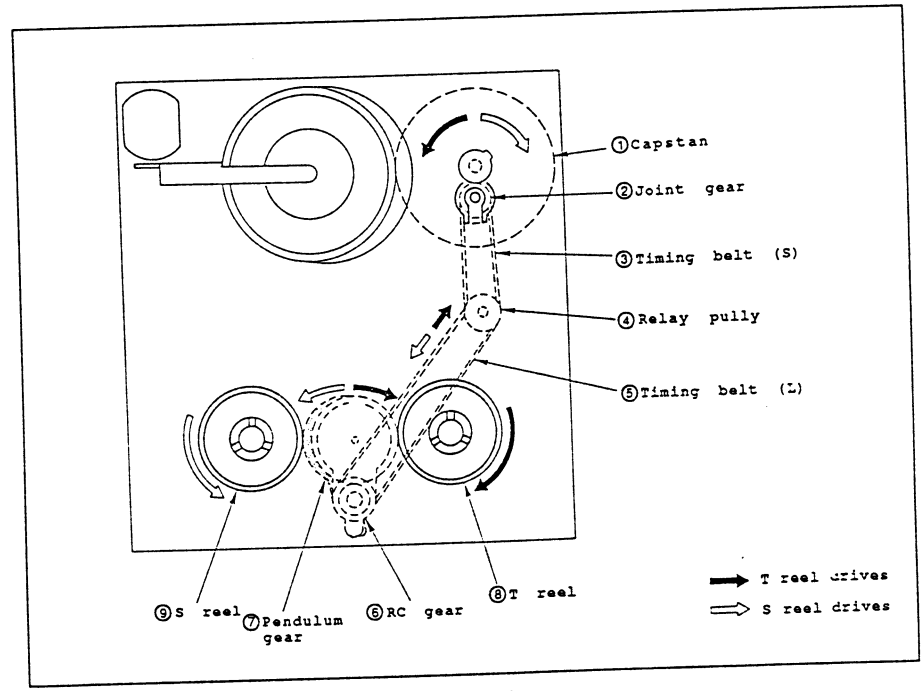
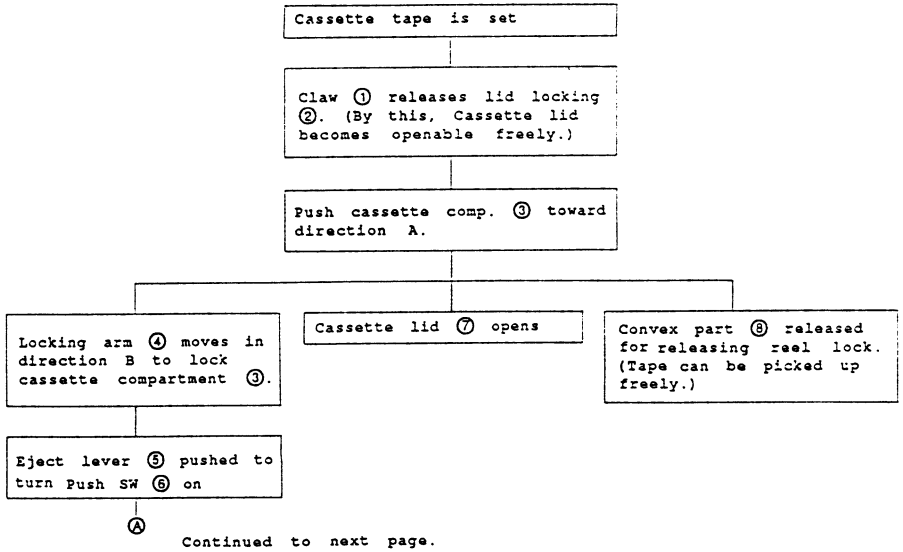


Fig.I-11

3. Each Mode Transition

3-1 Cassette In


Cassette tape is set
Claw ① releases lid locking ②. (By this, Cassette lid becomes openable freely.)
Push cassette comp. ③ toward direction A.
Locking arm ④ moves in direction B to lock cassette compartment ③.
Cassette lid ⑦ opens
Convex part ⑧ released for releasing reel lock. (Tape can be picked up freely.)
Eject lever ⑤ pushed to turn Push SW ⑥ on
Ⓐ
Continued to next page.

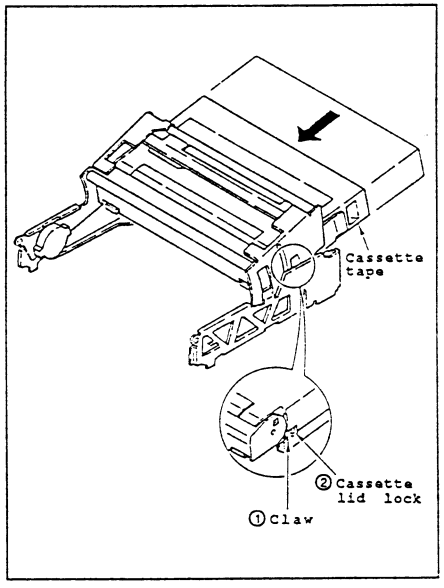


Fig.I-12

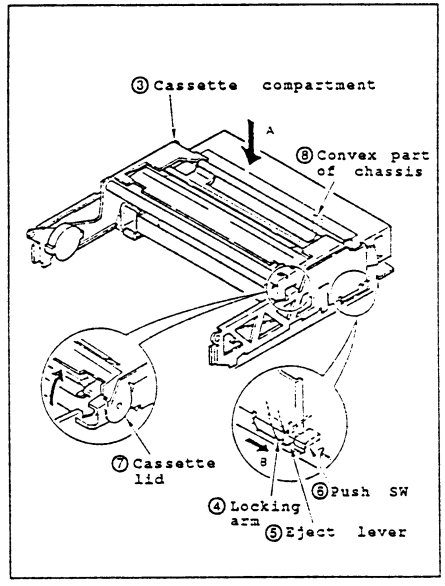
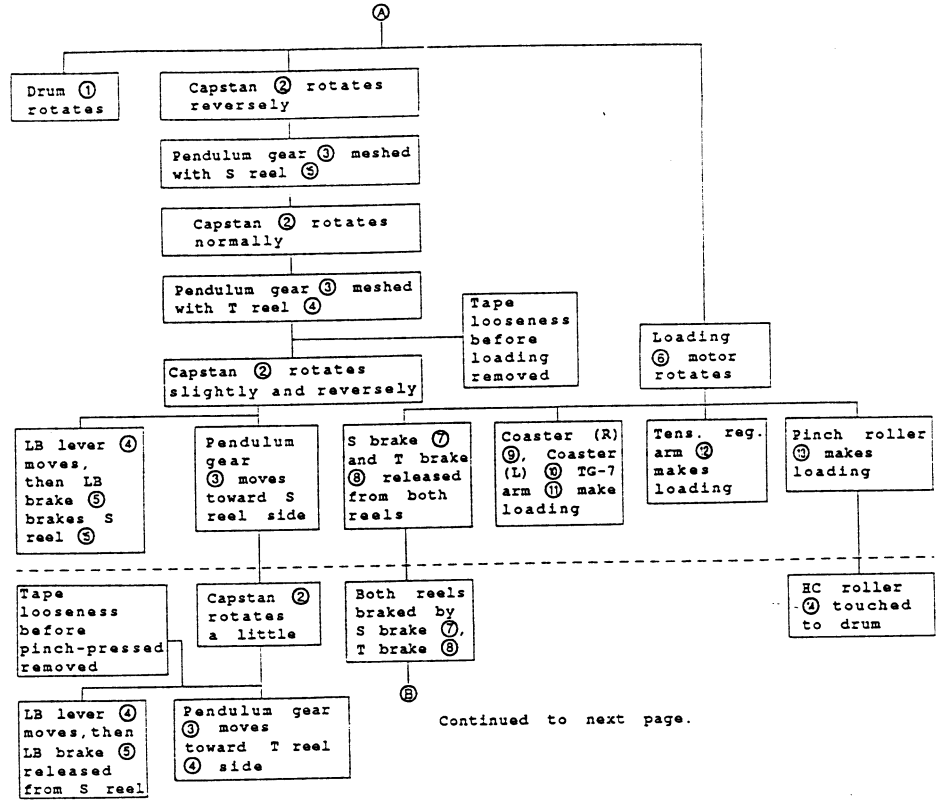


Fig.I-13


Ⓐ
Drum ① rotates
Capstan ② rotates reversely
Pendulum gear ③ meshed with S reel ⑤
Capstan ② rotates normally
Pendulum gear ③ meshed with T reel ④
Capstan ② rotates slightly and reversely
Tape looseness before loading removed
Loading ⑥ motor rotates
LB lever ④ moves, then LB brake ⑤ brakes S reel ⑤
Pendulum gear ③ moves toward S reel side
S brake ⑦ and T brake ⑧ released from both reels
Coaster (R) ⑨, Coaster (L) ⑩ TG-7 arm ⑪ make loading
Tens. reg. arm ⑫ makes loading
Pinch roller ⑬ makes loading
HC roller ⑭ touched to drum
Tape looseness before pinch-pressed removed
Capstan ② rotates a little
Both reels braked by S brake ⑦, T brake ⑧
Ⓑ
LB lever ④ moves, then LB brake ⑤ released from S reel
Pendulum gear ③ moves toward T reel ④ side
Continued to next page.

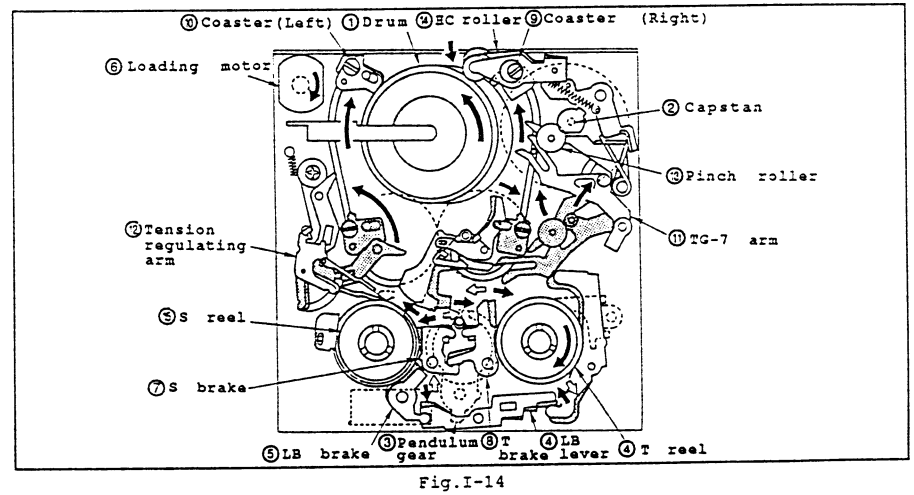
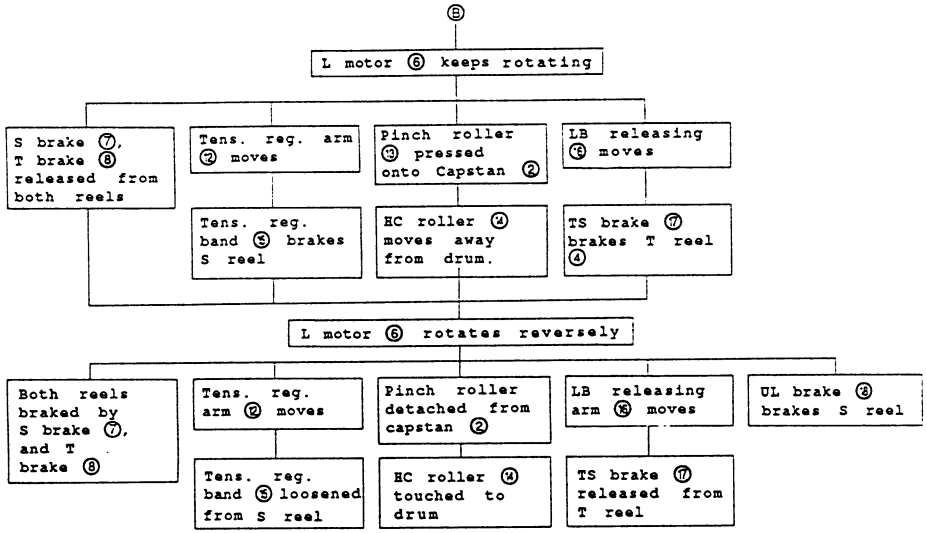


Fig.I-14


Ⓔ
L motor ⑥ keeps rotating
S brake ⑦, T brake ⑧ released from both reels
Tens. reg. arm ⑫ moves
Pinch roller ⑬ pressed onto Capstan ②
LB releasing ⑯ moves
Tens. reg. band ⑤ brakes S reel
HC roller ④ moves away from drum.
TS brake ⑰ brakes T reel ④
L motor ⑥ rotates reversely
Both reels braked by S brake ⑦, and T brake ⑧
Tens. reg. arm ⑫ moves
Pinch roller detached from capstan ②
LB releasing arm ⑯ moves
UL brake ⑱ brakes S reel
Tens. reg. band ⑤ loosened from S reel
HC roller ④ touched to drum
TS brake ⑰ released from T reel

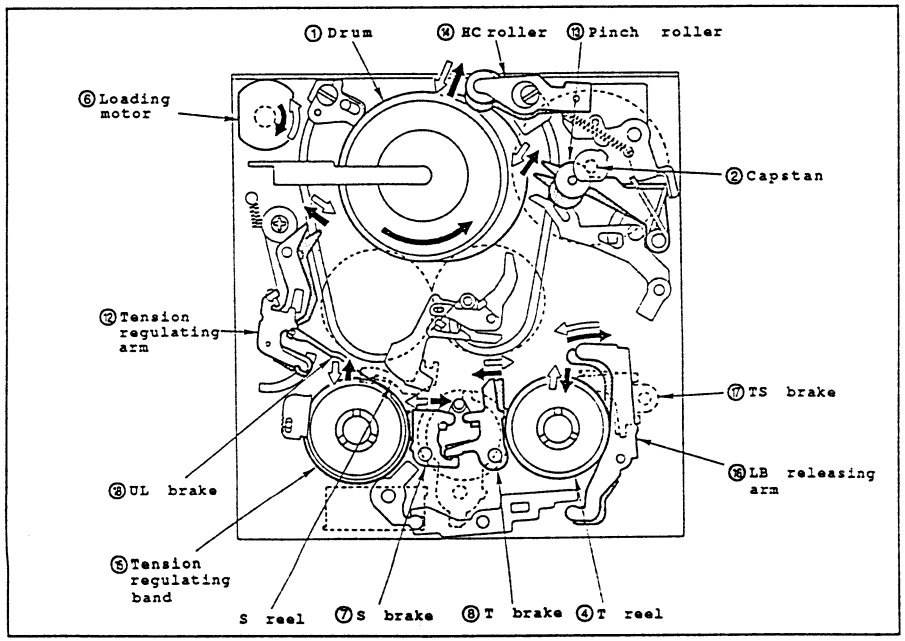
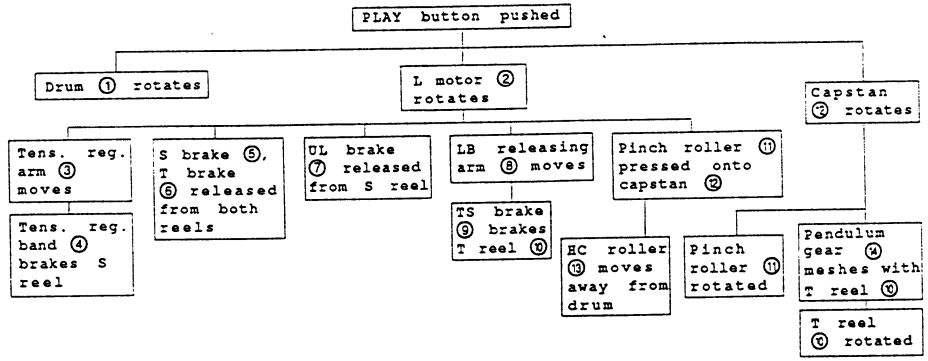


Fig.I-15


PLAY button pushed
Drum ① rotates
L motor ② rotates
Capstan ② rotates
Tens. reg. arm ③ moves
Tens. reg. band ④ brakes S reel
S brake ⑤, T brake ⑥ released from both reels
UL brake ⑦ released from S reel
LB releasing arm ⑧ moves
TS brake ⑨ brakes T reel ⑩
Pinch roller ⑪ pressed onto capstan ⑫
HC roller ⑬ moves away from drum
Pinch roller ⑪ rotated
Pendulum gear ④ meshes with T reel ⑩
T reel ⑩ rotated

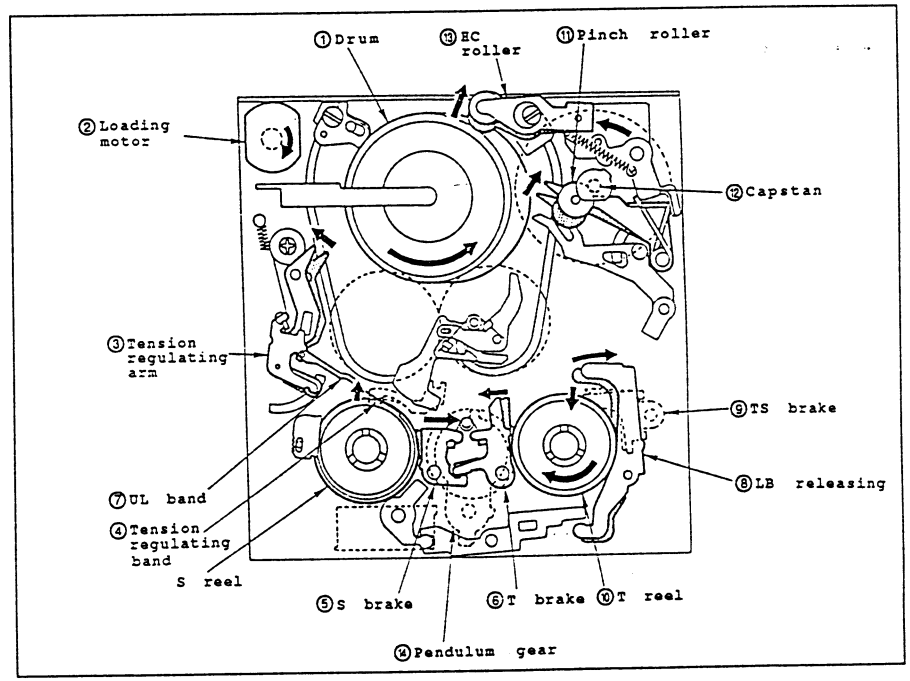


Fig.I-16

3-3 Tape Path

Tape pulled from S reel ①

Tension applied to tape by tens. reg. arm ②

Tape runs along TG-2 roller guide ③

Tape runs along TG-3 ④, then tilted by coaster (L) ⑤

Tape wound on drum ⑥

Tape tilt removed by coaster. (R) ⑦, then runs along TG-6 ⑧

Tape runs between capstan ⑨ and pinch roller ⑩ pressed

Tape runs along TG-7 ⑪

Tape taken up by T reel ⑫

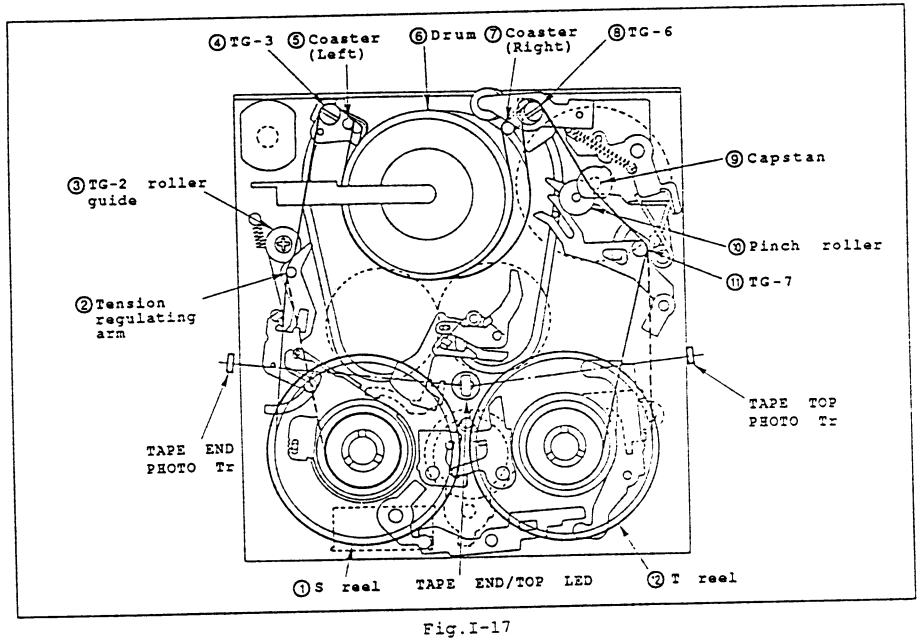


Fig.I-17

3-4 Pause

PAUSE button pushed at playback

Capstan ① stops

Pendulum gear ② stops

Pinch roller ④ stopped

T reel ③ stopped

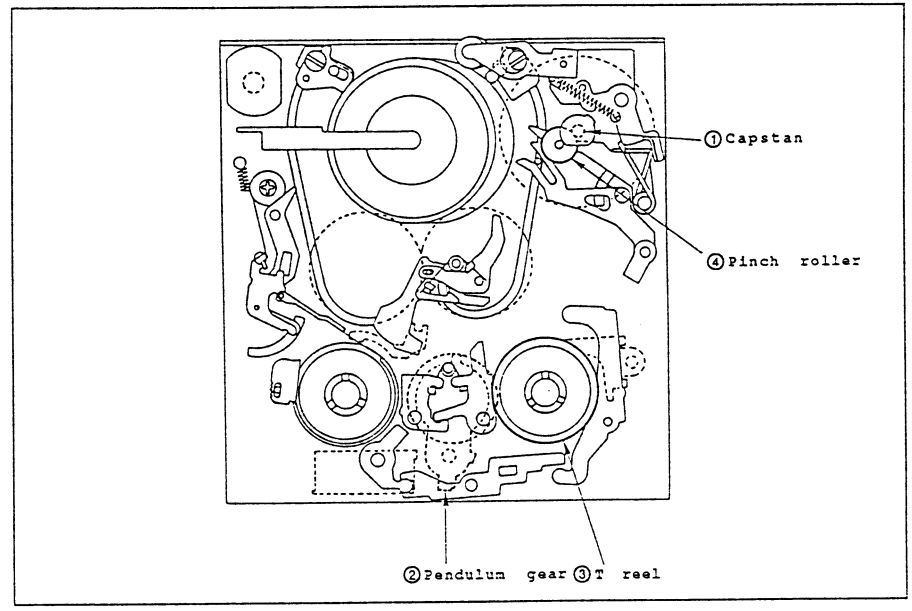


Fig.I-18

3-5 CUE

FF KEY button pushed at playback

Capstan ① rotates 9 times faster than at playback

Pendulum gear ② rotates at high speed

Pinch roller ④ rotated at high speed

T reel ③ rotated at high speed

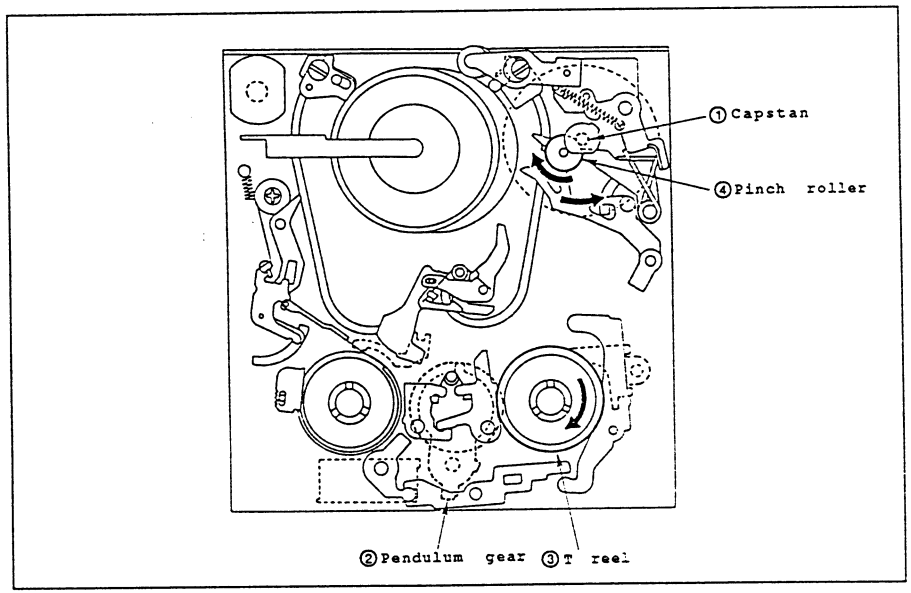


Fig.I-19

3-6 REV

REV KEY button pushed at playback

Capstan ① rotates reversely 7 times faster than at playback

Pendulum gear ② moves to be meshed with S reel ③

Pinch roller ④ rotated reversely at high speed

S reel ③ rotated at high speed

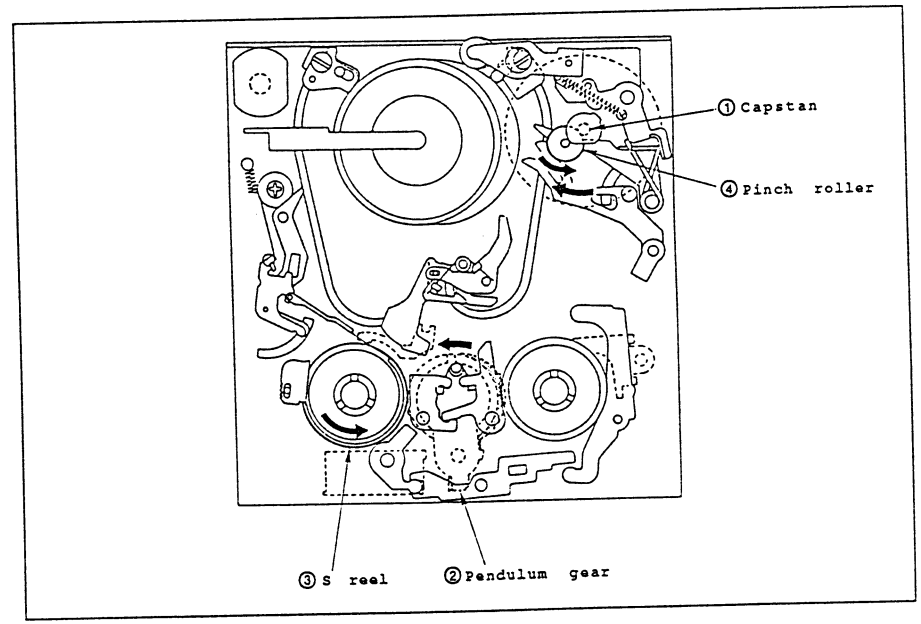
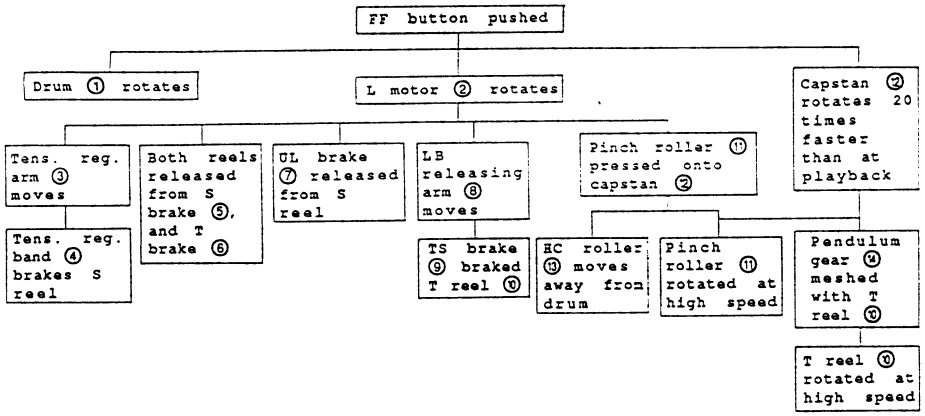


Fig.I-20

3-7 F.F


FF button pushed
Drum ① rotates
L motor ② rotates
Capstan ② rotates 20 times faster than at playback
Tens. reg. arm ③ moves
Both reels released from S brake ⑤, and T brake ⑥
UL brake ⑦ released from S reel
LB releasing arm ⑧ moves
Pinch roller ⑪ pressed onto capstan ②
Tens. reg. band ④ brakes S reel
TS brake ⑨ braked T reel ⑩
HC roller ⑬ moves away from drum
Pinch roller ⑪ rotated at high speed
Pendulum gear ⑭ meshed with T reel ⑩
T reel ⑩ rotated at high speed

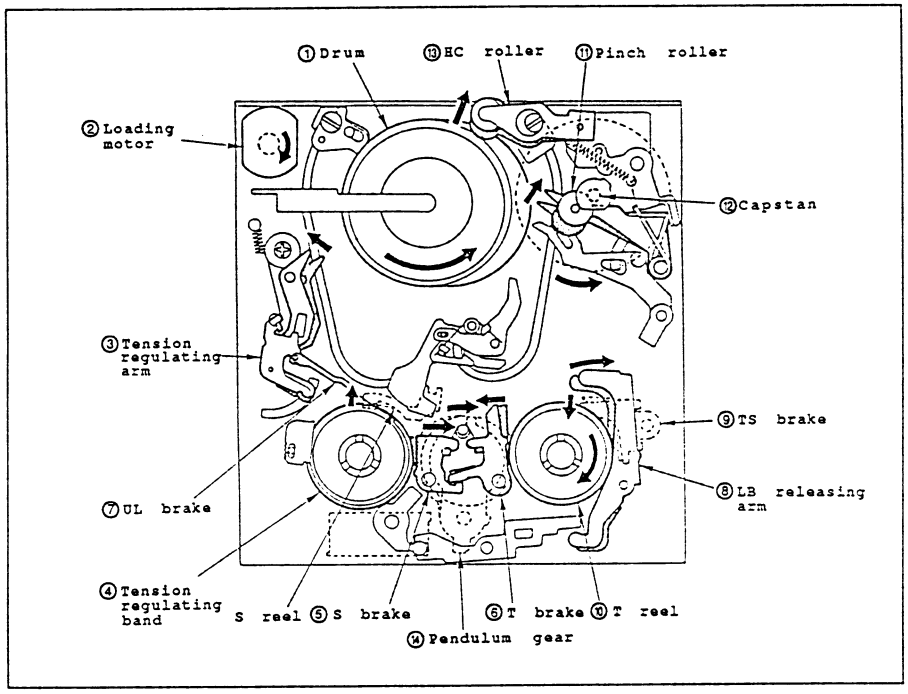
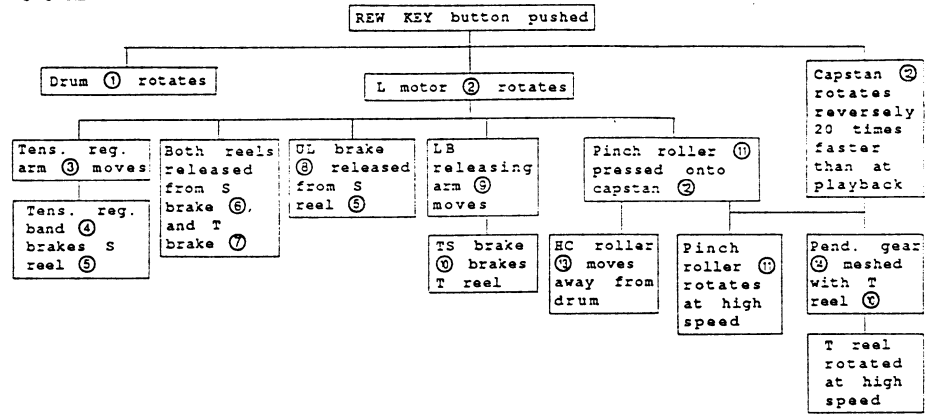


Fig.I-21

3-8 REW


REW KEY button pushed
Drum ① rotates
L motor ② rotates
Capstan ② rotates reversely 20 times faster than at playback
Tens. reg. arm ③ moves
Both reels released from S brake ⑥, and T brake ⑦
UL brake ⑧ released from S reel ⑤
LB releasing arm ⑨ moves
Pinch roller ⑪ pressed onto capstan ②
Tens. reg. band ④ brakes S reel ⑤
TS brake ⑩ brakes T reel
HC roller ⑬ moves away from drum
Pinch roller ⑪ rotates at high speed
Pend. gear ⑭ meshed with T reel ⑩
T reel rotated at high speed

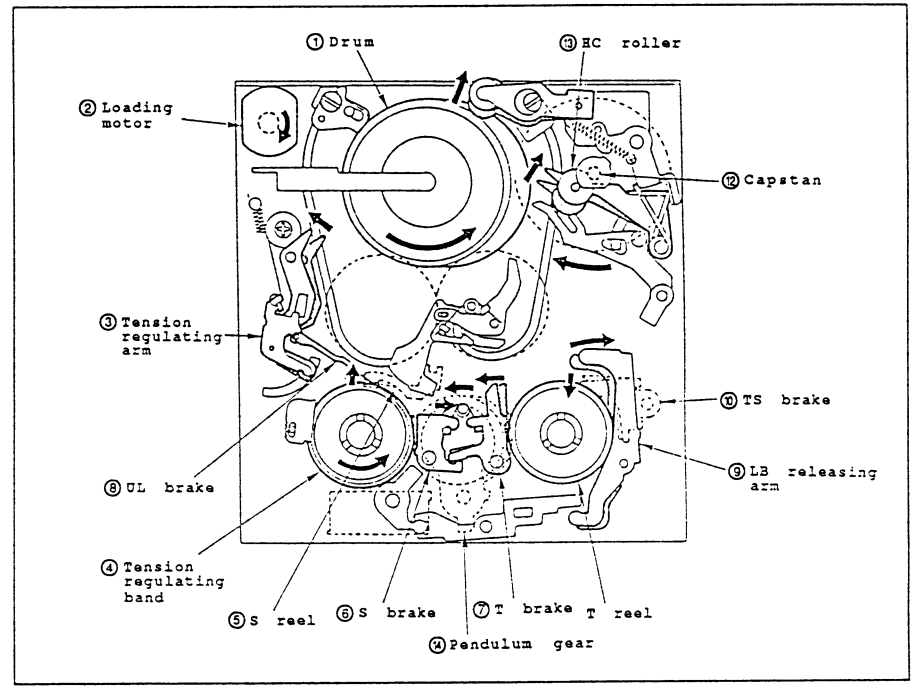
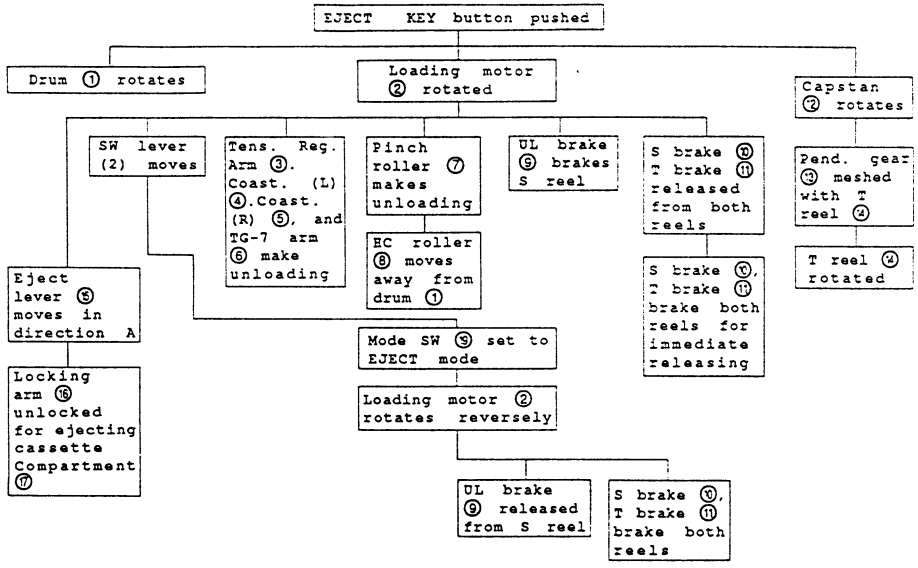


Fig.I-22

3-9 EJECT


EJECT KEY button pushed
Drum ① rotates
Loading motor ② rotated
Capstan ⑫ rotates
SW lever (2) moves
Tens. Reg. Arm ③. Coast. (L) ④.Coast. (R) ⑤, and TG-7 arm ⑥ make unloading
Pinch roller ⑦ makes unloading
UL brake ⑨ brakes S reel
S brake ⑩ T brake ⑪ released from both reels
Pend. gear ⑬ meshed with T reel ④
HC roller ⑧ moves away from drum ①
S brake ⑩, T brake ⑪ brake both reels for immediate releasing
T reel ④ rotated
Eject lever ⑮ moves in direction A
Mode SW ⑨ set to EJECT mode
Locking arm ⑯ unlocked for ejecting cassette Compartment ⑰
Loading motor ② rotates reversely
UL brake ⑨ released from S reel
S brake ⑩, T brake ⑪ brake both reels

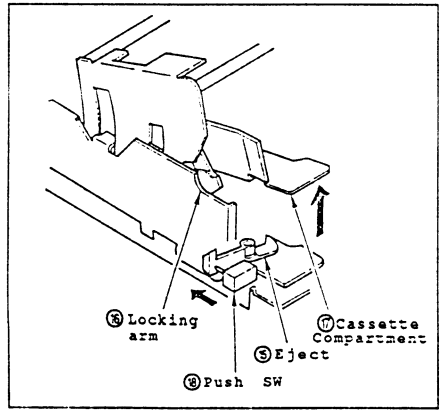


Fig.I-23

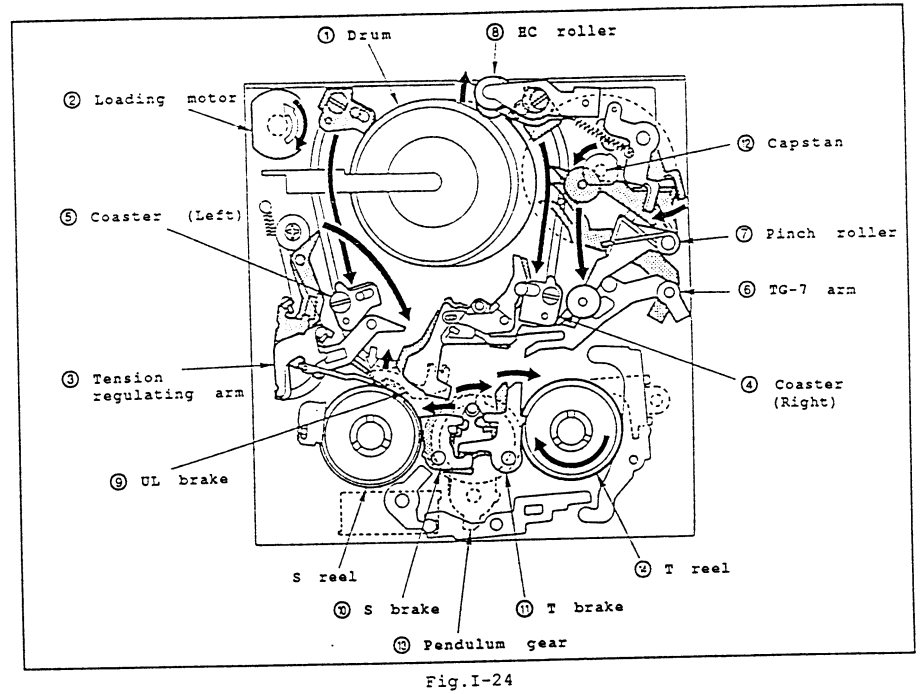


Fig.I-24

Chapter 2 Adjustments/Replacement

1. Recorder Section Mechanical Check/Adjustment

*Note: For details, i.e. removal of covers, C.B.A.S, location of test points, etc., refer to the service manual of product which equips this mechanism.

1-1 List of Maintenance Tools and Supplies

Maintenance Tools

Description	Tool No.	Remarks
Cassette Torque Gauge for 8mm	DY9-1047-000	
Alignment Tape K (Tracking B)	DY9-1085-000	New (for NTSC)
Alignment Tape L (Tracking C)	DY9-1086-000	New (for PAL/SECAM)
Hexagonal wrench (0.89mm)		New (Commercially available)
Rotary drum jig kit		Enclosed in repair kit

Supplies

Description	Tool No.	Remarks
Lens Tissue K-1, K-3	CY9-4023-003	Camera Service Dept.
Molyton Grease	DY9-3009-000	
Hydroflud NT-68	DY9-3010-000	*See the note below
Ethyl alcohol		Commercially available

*Note: In U.S.A., contact video service Div., Canon U.S.A., Inc. for ordering.

1-2 Removal of cassette Compartment Assembly (Fig.II-1)

(1) Remove setscrews ① and ②.
(2) To detach cassette compartment assembly, slide the assembly a little toward you. (Ⓐ parts in Fig.II-1 detached)
Then take out the assembly.

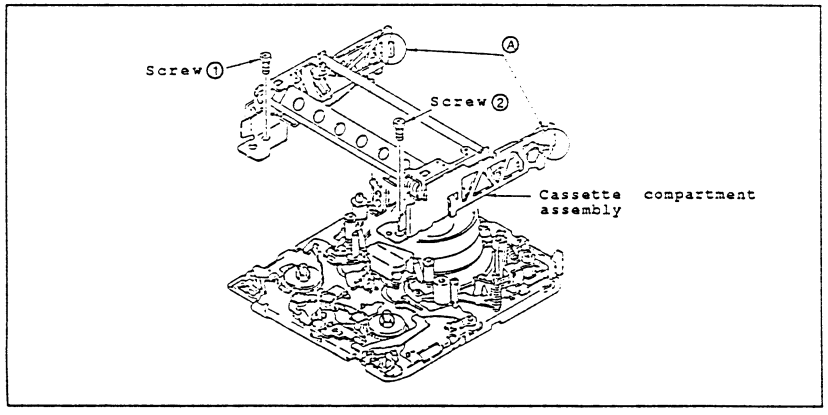


Fig.II-1

1-3 Tape Loading/Play without LS cassette Compartment Assembly and Tape

*Note: Remove a strong light source when performing the followings.
If performed near the strong light source, a tape sensor misoperated.

1-3-1 Loading (Fig.II-2)

(1) Cover a tape sensor LED with an opaque cap ① or equivalent.
(2) To press a pin, attach a tape onto the Recog. switch ②.
(3) Move the Eject lever ③ in the direction of Ⓐ.

1-3-2 Play (Fig. II-2)

(1) Set loading state.
(2) Snap a rubber band ④ around the S and T reels.
(3) To rotate T reel, push the play Key Switch.
When the tape starts moving, push the tension regulating arm ⑤ in the direction of Ⓑ. (At this time, the tension regulating band is released, and the S reel moves.)

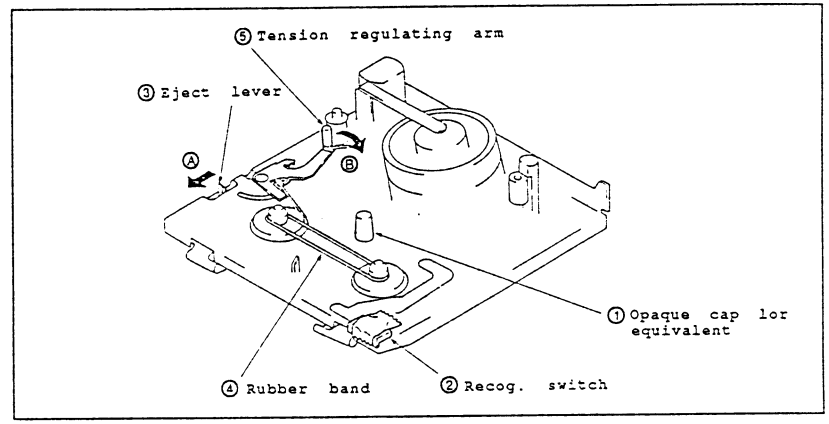


Fig.II-2

1-4 Independent Operation of Mechanism Section

*Note: Perform this operation when the C.B.A.S are removed.

(1) To expose the terminals, remove the tape from the upper part of loading motor. (Fig.II-3)
(2) Supply 3V (approx.) to the terminals of loading motor ① from the constant voltage supplier.
(3) For confirming the mechanical modes, use the output of slide switch ② (mode switch). (Fig.II-4, Table II-1).

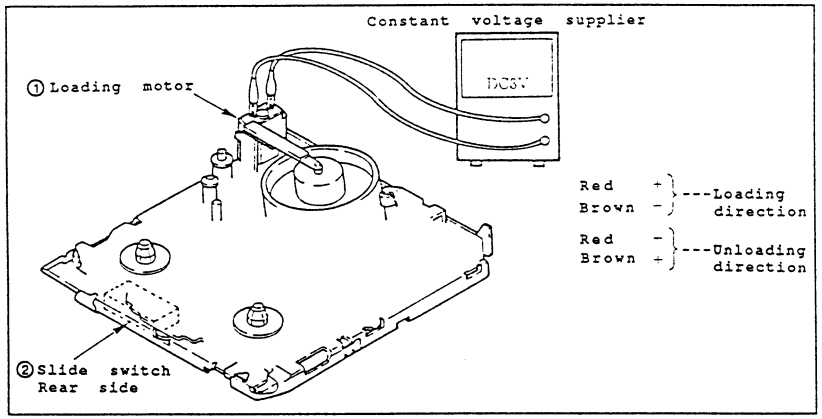


Fig.II-3

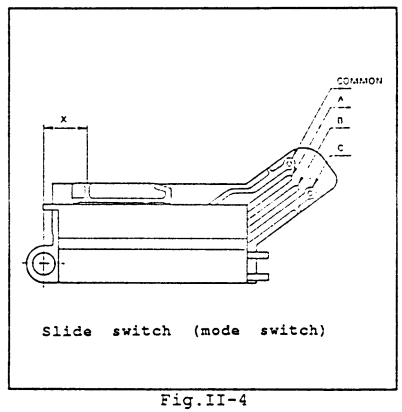


Fig.II-4

Modes	X (mm)	A	B	C
Eject	1.7-2.7	opened	opened	shorted
Blank	2.7-5.7	opened	opened	opened
Load/Unload	5.7-6.7	opened	shorted	shorted
Blank	6.7-8.1	opened	shorted	opened
Stop	8.1-9.1	shorted	shorted	opened
Blank	9.1-12.0	shorted	opened	opened
Play	12.0-13.3	shorted	opened	shorted

Note: "Opened" and "shorted" in the table is versus the COMMON.

Table II-1

2. Periodic Check/Confirmation and Notes for Each Mechanism

To maintain the performances of equipment and tape properly, perform the following checks periodically. Also, after repairing, confirm the followings regardless of the length of use hours.

• Cleaning

2-1 Rotary Drum

(1) Clean the rotary drum gently with a thick lens tissue (CY9-4023-003) with ethyl alcohol wetted.
When cleaning, rotate the rotary drum counterclockwise gradually by hand.

*Notes: 1. Do not rotate the motor by using the power source.
2. Do not rotate the drum clockwise.
3. Do not clean the drum except the above procedure.
If the lens tissue with ethyl alcohol soaked is used vertically to head chip, the head chip may be damaged.

2-2 Tape Path

(1) Clean the tape path (No.1-7 guides, Capstan shaft and Pinch roller) by using a lens tissue with ethyl alcohol soaked. (Fig.II-5)

2-3 Driving System (Timing belt, surface of reel table)

(1) Clean the timing belt and the reel table by using a lens tissue with ethyl alcohol soaked.

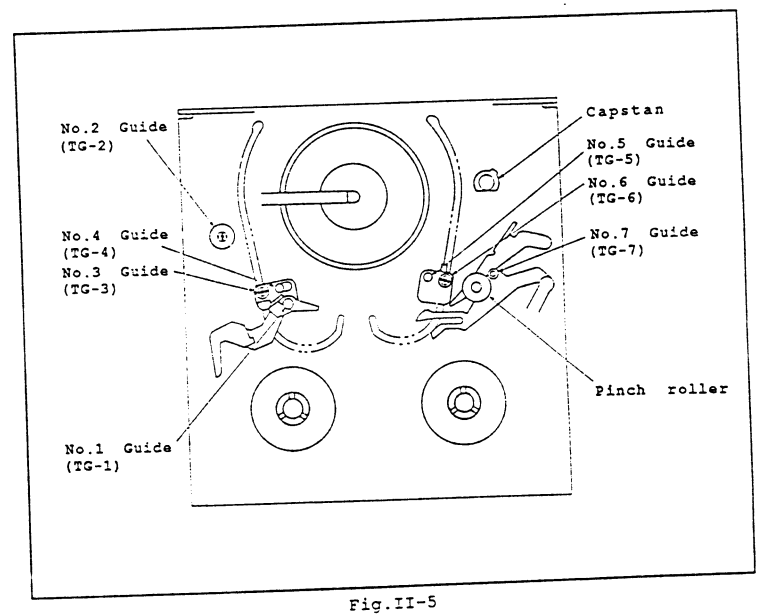


Fig.II-5

2-4 Periodic Check/Confirmation Items

When performing periodical Check/Confirmation, refer to the following items.

Check/Conformation items		Hours of Use(H)										Remarks
		500	1000	1500	2000	2500	3000	3500	4000	4500	5000	
Drum/ Tape Path	Cleaning of tape path surface	○	○	○	○	○	○	○	○	○	○	Be careful for oil
	Cleaning of rotary drum assembly	○	○	○	○	○	○	○	○	○	○	Be careful for oil
Driving Systems	Relay belt	—	☆	—	☆	—	☆	—	☆	—	☆	
	Capstan shaft	—	◉	—	◉	—	◉	—	◉	—	◉	Be absolutely careful not to put oil on the tape path surface.
	Relay pully shaft	—	◉	—	◉	—	◉	—	◉	—	◉	
	Loading motor	—	☆	—	☆	—	☆	—	☆	—	☆	
Confirmation	Abnormal noise	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	
	Back tension measurement	—	☆	—	☆	—	☆	—	☆	—	☆	
	Brake system	—	☆	—	☆	—	☆	—	☆	—	☆	
	FWD.RVS torque measurement	—	☆	—	☆	—	☆	—	☆	—	☆	

Oil and Grease

(1) "One drop of oil" means the amount which sticks to a 2mm diameter rod, as shown in Fig.II-6.
(2) Use oil and grease specified below.
Molyton grease DY9-3009-000
Hydroflud-NT68 Commercially available (DY9-3010-000).
(3) For a shaft receiver, be sure to use the oil without dust particles, etc. If the oil with such substances used, a shaft receiver may be damaged by friction, etc..

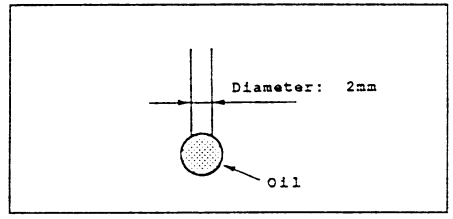


Fig.II-6

3-1 Roller Assembly

• Disassembling (Fig.II-7)

(1) To dismount the roller assembly ②, removes a screw ①.

• Reassembling (Fig.II-7)

(1) Install the roller assembly while aligning the two dowels with the two holes ④ at mechanical chassis.
(2) Secure the roller assembly ② with a screw ①.

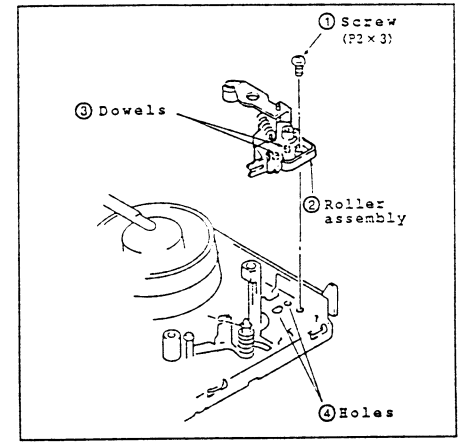


Fig.II-7

3-2 Guide Guard

• Disassembling (Fig.II-8)

(1) To detach the guide guard, remove a screw ①.

• Reassembling (Fig.II-8)

(1) Install the guide guard while aligning the dowel ③ with the hole ④.
(2) Secure the guide guard ② with a screw ①.

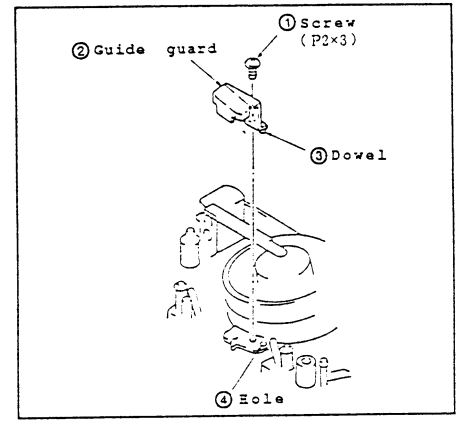


Fig.II-8

3-3 Capstan Motor

• Disassembling (Fig.II-9)

(1) Set the unloading state.
(2) Rotate the stopper ① in direction Ⓐ until it comes to an end.
(3) To take out the capstan motor ③, remove the two set screws ②.

• Reassembling (Fig.II-9)

(1) Align the two dowels ④ with the two holes ⑤ to match the gear section ⑥ with the connecting gear ⑦.
(2) Secure the capstan motor ③ with the two set screws ②.
(3) Rotate the stopper ① in direction of Ⓑ until it comes to an end.

*Notes: 1. Do not match the gear section ⑥ and the connecting gear ⑦ forcibly to prevent the cam grooves damaging.
2. Fit the capstan motor ③ and the chassis without space.
3. Do not touch the capstan motor shaft, the rotor section and the oil seals.

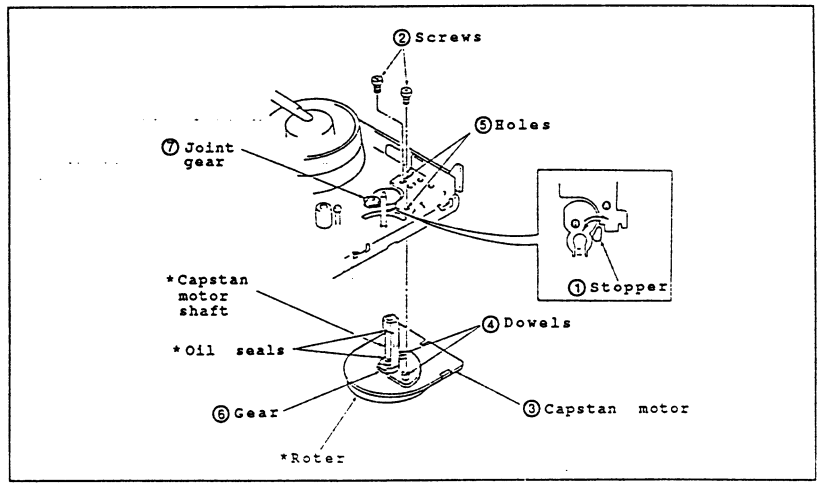


Fig.II-9

3-4 S Brake, T Brake

• Disassembling (Fig.II-10)

(1) Remove the spring ①.
(2) To take out the T brake ③, remove the shaft pin ②.
(3) To take out the S brake ⑤, remove the shaft pin ④.

*Note: If the claw part of shaft pin ② and ④ damaged, replace them.

• Reassembling (Fig.II-10)

(1) Install the S brake ⑤ while inserting the gear ⑥ into the notch ⑦.
(2) Attach the shaft pin ④.
(3) To install T brake ③, put the shaft ⑧ of T brake ③ into the S reel side comparing the brake releasing arm ⑨. At this time, part Ⓐ must be at the drum side comparing part Ⓑ.
(4) Attach the shaft pin ②.
(5) Insert the spring ① under the claw ⑪ of shaft ⑩.
Hook the spring ① on the claws ⑫, respectively.

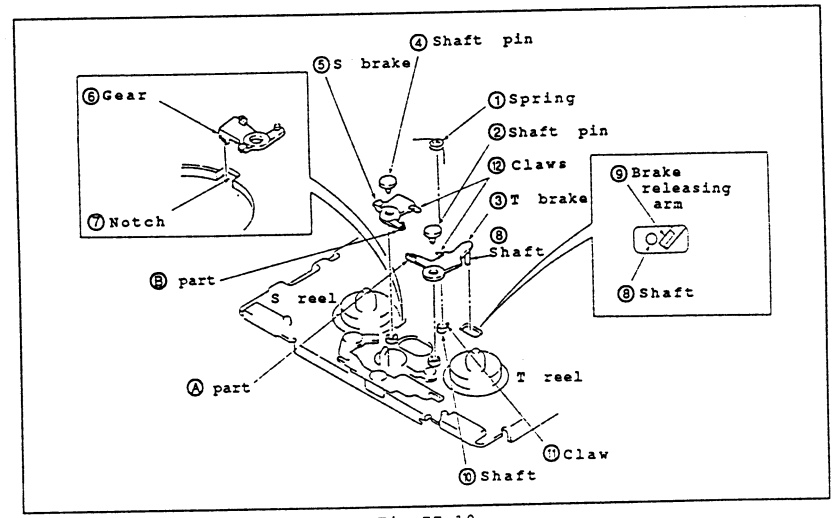


Fig.II-10

3-5 LB Brake, LB Lever

• Disassembling (Fig.II-10)

(1) To take off the TL plate ②, remove the screw ①.
(2) To take off the LB brake ④, remove the shaft pin ③.
(3) To take off the LB lever ⑥, remove the shaft pin ⑤.

*Note: If the claw part of shaft pin ③ and ⑤ damaged, replace them.

• Reassembling (Fig.II-11)

(1) Assemble the LB lever ⑥ while inserting the LB gear pin ⑦ to the hole of LB lever ⑥. Then, secure it with the shaft pin ⑤.
(2) Assemble the LB brake ④ while inserting the pin ⑧ to the notch ⑨ of LB lever ⑥ and the gear ⑩ to the notch ⑪.
(3) Install the shaft pin ③.
(4) Assemble TL plate ② while aligning the dowel ⑫ and the hole ⑬. Then, secure it with the screw ①.

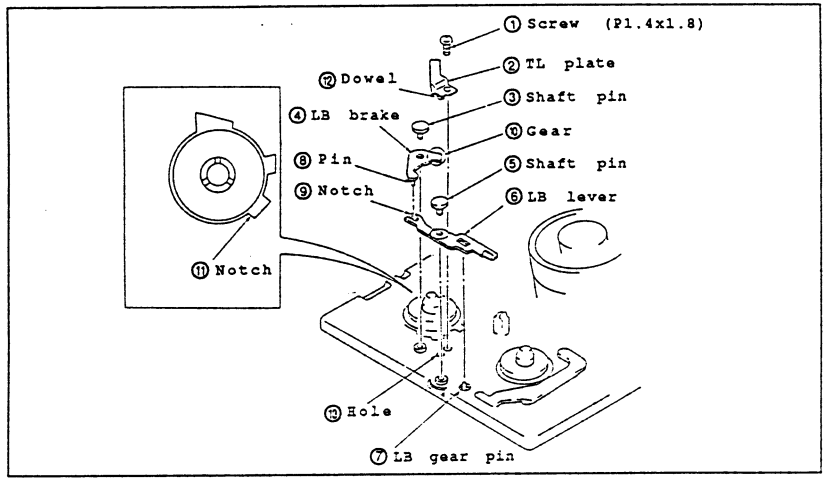


Fig.II-11

3-6 LB Releasing Arm

• Disassembling (Fig.II-12)

(1) Take off the LB releasing arm ② while pushing the claw ① in the arrow direction.

• Reassembling (Fig.II-12)

(1) Install the LB releasing arm ② to the shaft ③ while inserting ⓐ, ⓑ, ⓒ and ⓓ to the holes ④, respectively.
Then, secure it by hooking the claw ①.

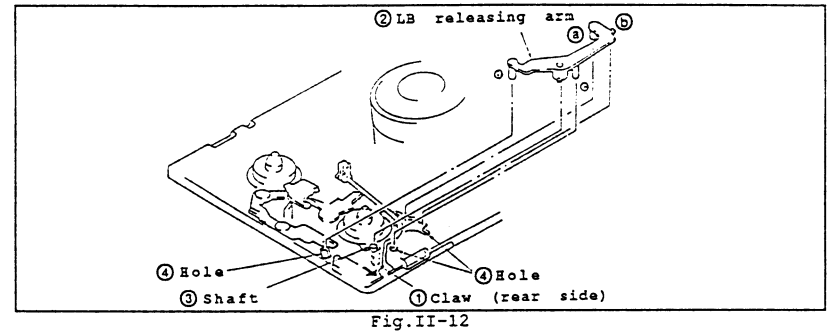


Fig.II-12

3-7 RK Stopper, RK Stopper Arm

• Disassembling (Fig.II-13)

(1) Remove the screw ①.
(2) To take off the RK stopper arm ③, unhook the claw ② of chassis.
(3) Take off the RK stopper ④.

• Reassembling (Fig.II-13)

(1) Assemble the RK stopper ④ onto the shaft ⑤.
(2) Assemble RK stopper arm ③ onto the shaft ⑥ while inserting the pin ⑩ to the hole ⑪.
Then, secure it by hooking the claw ② to the hole ⑦.
(3) Install the spring ① to the shaft ⑤.
Then, hook it to the claws ⑧ and ⑨, respectively.

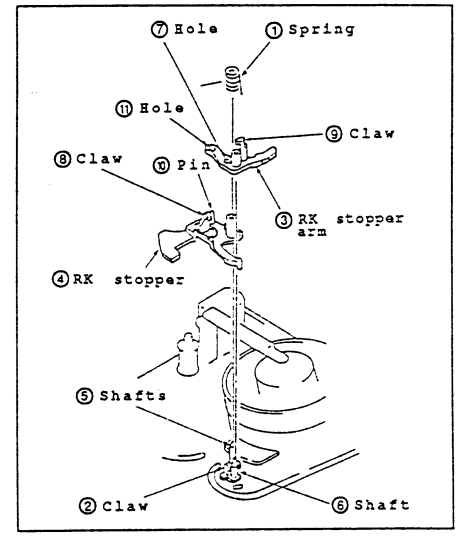


Fig.II-13

3-8 Pinch Arm, TG-7 Arm

• Disassembling (Fig.II-14)

(1) Set the unloading state.
(2) To take off the pinch arm ②, remove the washer ①.
(3) To detach the TG-7 plate spring ⑤, bend the claw ④ of hole ③ by using a thin screwdriver or equivalent.
(4) Detach the TG-7 arm.

• Reassembling (Fig.II-14)

(1) Apply the grease on the inside and the bottom surface of the hole ⑦.
(2) Insert the shaft ⑧ of TG-7 arm ⑥ to the hole ⑦.
(3) Apply the grease on the shadowed area ⓐ. (Fig.A)
(4) Insert the TG-7 plate spring ⑤ to the hole ③.
Then, secure it by hooking the claw ④.
(5) Apply the 1/2 drop of oil to the shaft ⑨.(Fig.B)
(6) Insert the pinch arm ② to the shaft ⑨.
Then, assemble while inserting the pinch sub-arm's cut-up part into the ⓒ part.
(7) Secure it with the washer ①.

* Notes:1. Do not apply the grease on the screw ⑪ of TG-7 arm ⑥. (Fig.A)
2. Be careful for the TG-7 guide and the rubber part when inserting.
3. After reassembled, be sure to perform the tape path adjustment.

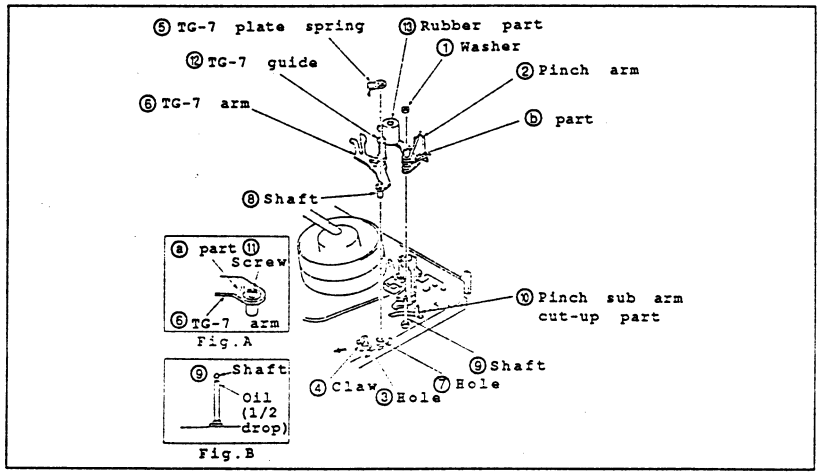


Fig.II-14

3-9 TG-2

• Disassembling (Fig.II-15)

(1) Take out the TG-2 upper flange ①.
(2) Take out the TG-2 roller ②, TG-2 sleeve ③, TG-2 lower flange ④ and the coil spring ⑤.

• Reassembling (Fig.II-15)

(1) Install the coil spring ⑤, TG-2 lower flange ④, TG-2 sleeve ③ and TG-2 roller ② to the shaft.
(2) Secure the TG-2 upper flange ① to the shaft by turning it four to 6 times.

• Presetting (Fig.II-16)

(1) Turn the TG-2 upper flange ① to adjust the height between the mechanical chassis surface and the TG-2 upper flange to 18.6mm.

*Note: After presetting, perform the tape path adjustment.

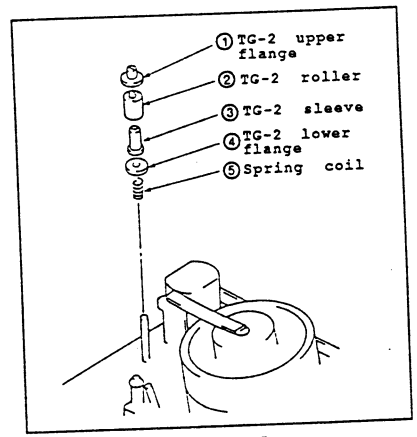


Fig.II-15

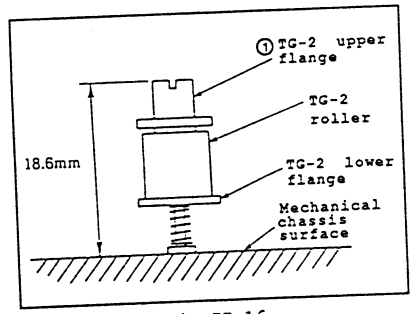


Fig.II-16

3-10 S Reel Table, T Reel Table

• Disassembling (Fig.II-17)

(1) In the same procedures in "3-4", dismount the S and T brake.
(2) In the same procedures in "3-5", detach the TL plate.
(3) In the same procedures in "3-11", take off the tension regulator band.
(4) Dismount the S reel table ①.
(5) Turn the stopper ② in the direction of Ⓐ by 90° approximately.
(6) While shifting the LB releasing arm ③ in the direction of Ⓑ, dismount the T reel table.

• Reassembling (Fig.II-17)

*Caution: When mounting S and T reel tables, be careful not to drop the oil onto the reflection plate at the rear side. If the oil dropped, dust particles may put on and it makes the counter inaccurate.

(1) Apply the 1/2 drop of oil to the shaft ⑤. (Fig.A)
(2) Rotate RK gear ⑥ to the direction of Ⓒ.
Rotate the TS brake ⑦ to the direction of Ⓓ.
(3) While shifting the LB releasing arm ③ to the direction of Ⓑ, mount the T reel table ④ to the shaft ⑤.
Then, turn the stopper ② to the direction of Ⓕ until it comes to an end.
(4) Apply the 1/2 drop of oil to the shaft ⑧. (Fig.B)
(5) Rotate the RK gear ⑥ to the direction of Ⓕ.
Rotate the UL brake ⑨ to the direction of Ⓖ.
Rotate the LB brake ⑩ to the direction of Ⓗ.
(6) Mount the S reel table to the shaft ⑧.
(7) In the same procedures in "3-11", hook up the tension regulator band.
(8) In the same procedures in "3-5", attach the TL plate.
(9) In the same procedures in "3-4", mount the S brake and T brake.

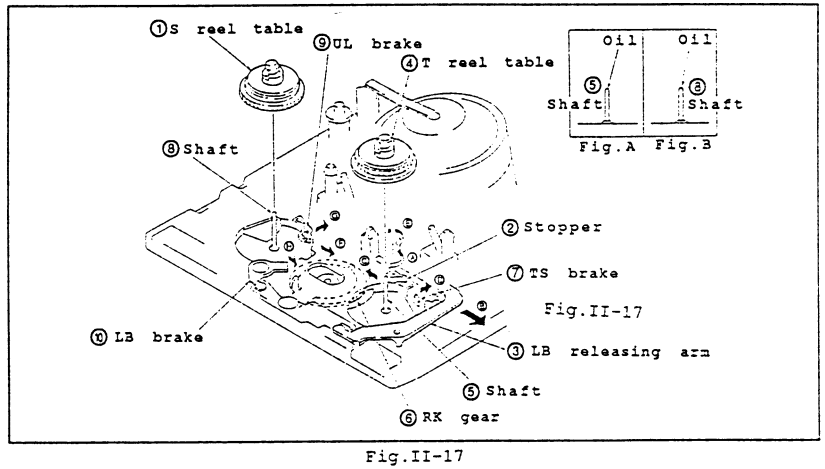


Fig.II-17

3-11 Tension Regulator Band/Arm

• Disassembling (Fig.II-18)

(1) In the same procedures in "3-5", detach the TL plate.
(2) Remove the screw ①.
(3) Take off the tension regulator band from the shaft ③ of tension regulator arm ② by using a thin screwdriver or equivalent.
(4) Remove the spring coil ⑤.
(5) Remove the washer ⑥ from the rear side of mechanical chassis. Then, detach the tension regulator arm ②.
(6) To detach the adjust arm ⑧, unhook the claw ⑦.

*Note: When detaching the tension regulator band ④, be careful not to twist or fold it. Also, when detaching it, do not touch the felt side ⑨ and drop the oil.

• Reassembling (Fig.II-18)

(1) Mesh the adjust arm ⑧ with the position indicated in the Fig. A, then, hook the claw ⑦.
(2) Apply the 1/2 drop of oil to the hole ⑩.
(3) Attach the tension regulator arm ② to the slot ⑪ while inserting ⓐ part inside of switch lever a'ssy. (Ⓐ indicated by an arrow.) (Fig.B)
(4) While pressing the tension regulator arm ② from the front side of chassis, secure it with a washer ⑥ from the rear side.
(5) Hook the spring coil ⑤ to the adjust arm ⑧ and the tension regulator arm ②, respectively. The direction of coil is as indicated in the Fig.
(6) Attach the tension regulator band ④ to the shaft ③ of the tension regulator arm ② while fitting the felt side ⑨ onto the shadow area of S reel table ⑫.
(7) Assemble the tension regulator plate ⑬ of the tension regulator band ④ while aligning it with the dowel ⑭ of chassis. Then, secure it with the screw ①.
(8) In the same procedures in "3-5", attach the TL plate.
(9) In the same procedures in "3-21", perform the tension regulator adjustment.
(10) In the same procedures in "3-22", perform the back tension adjustment.

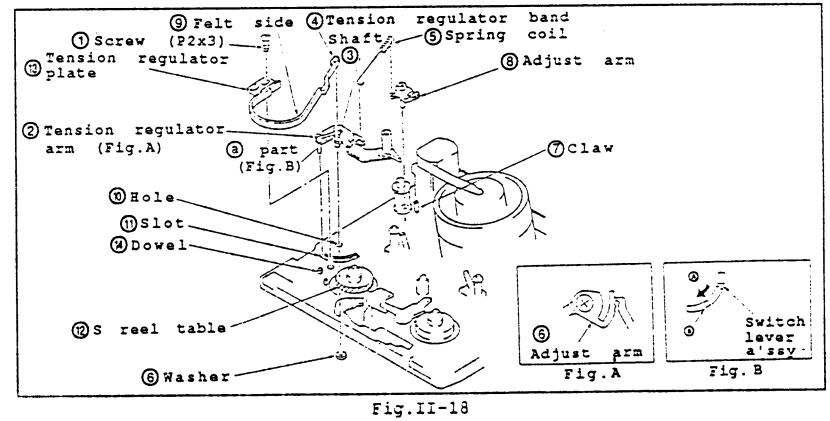


Fig.II-18

3-12 Drum Unit, Dew Sensor

• Disassembling (Fig.II-19)

(1) Set unloading state.
(2) Unplug the flexible connector ① and the connectors ②.
(3) In the same procedures in "3-2", detach the guide guard.
(4) To detach the earth terminal ④, remove the screw ③.
(5) To dismount the drum ⑥ from the chassis, remove the three setscrews ⑤.
(6) Disconnect the connector ⑩.
(7) To detach the dew sensor ⑧, remove the screw ⑦.

• Reassembling (Fig.II-19)

(1) Mesh the ⓐ part of dew sensor ⑧ with the notch ⑪. Then, secure them with the screw ⑦.
(2) Attach the connector ⑩.
(3) Put the harness ⑮ of dew sensor ⑧ under the claw ⑯. (Fig.A)
(4) Insert the connectors ② and the flexible connector ① into the chassis' hole ⑫.
Then, mount the drum while aligning the dowels ⑬, and secure it with the screws ⑤.
(5) While aligning the earth terminal ② with the chassis' two dowels ⑭, secure it with the screw ③.
(6) In the same procedures in "3-2", attach the guide guard.
(7) Attach two connectors ② and the flexible connector ① to the C.B.A..

*Notes: 1. Be careful not to flaw the head chip ⑨ and the tape path surface of drum ⑥.
2. After reassembling, perform the tape path adjustment.

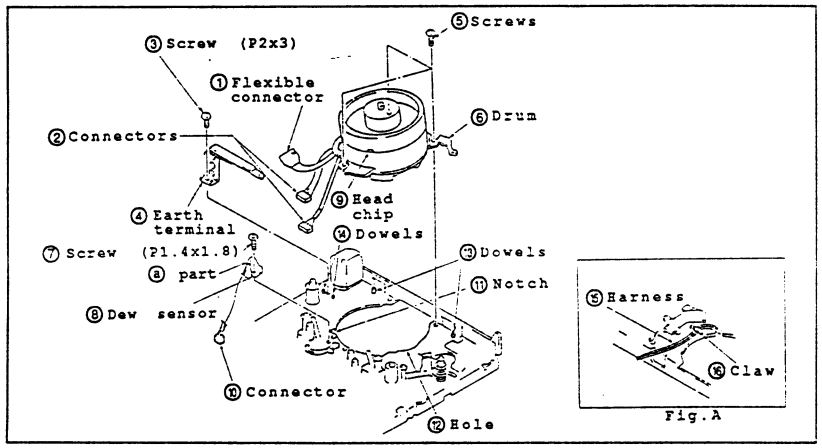


Fig.II-19

3-13 Eject Lever, Switch Lever, Pinch Sub Arm

• Disassembling (Fig.II-20)

(1) Set unloading state.
(2) In the same procedures in "3-3", dismount the capstan motor.
(3) To dismount the eject lever ②, unhook the claw ①.
(4) To detach the switch lever ④, remove the washer ③.
(5) Remove the spring ⑤.
(6) To detach the pinch sub arm ⑦, remove the washer ⑥.

• Reassembling (Fig.II-20)

(1) Apply the grease onto the shaft ⑧. (Fig.A)
(2) Assemble the pinch sub arm ⑦ while inserting the ⓐ part into the slot ⑨.
(3) Secure it with the washer ⑥.
(4) Hook the ⓑ part of spring ⑤ between the claw ⑫ and the chassis side while hooking ⓒ part to the claw ⑫.
(5) Apply 1/2 drop of oil to the shaft ⑬. (Fig.B)
(6) Assemble the switch lever ④ to the shaft ⑬ while aligning the groove ⑭ with the projection ⑮ of mode switch. At this time, insert the pin ⑯ to the outside groove ⑰ of drive gear (left) ⑰.
(7) Secure it with a washer ③.
(8) Attach the eject lever ② and hook the claw ①.
(9) In the same procedures in "3-3", mount the capstan motor.

*Note: When installing the switch lever ④ to the shaft ⑬, set the pin ⑯ of tension regulator arm to the inside of switch lever ④. (within the extent of Ⓐ indicated by an arrow.)

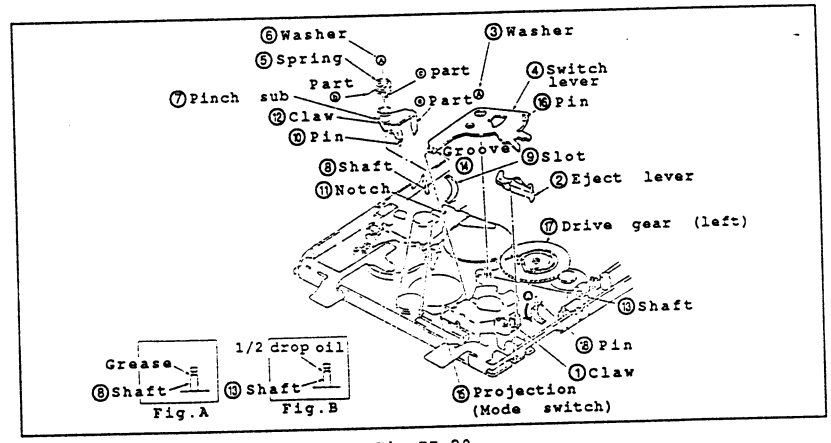


Fig.II-20

3-14 Timing Belt (L), RC Gear, Loading Lever, Timing Belt(S), Joint Gear

• Disassembling (Fig.II-21)

(1) Set unloading state
(2) In the same procedures in "3-3", dismount the capstan motor.
(3) In the same procedures in "3-13", detach the pinch sub arm.
(4) Remove the washer ①. Then dismount the RC gear ② (with the timing belt (L) ③ hooked) from the shaft ④.
(5) Remove the washer ⑥. Then, detach the loading lever ⑧ while pushing the claw ⑦ toward the direction Ⓐ.
(6) Turn the stopper ⑨ toward the direction Ⓑ by 90°.
(7) Detach the joint gear ⑪ (with the timing belt(S) ⑩ hooked) from the shaft ⑯.
(8) Separate the timing belt(S) ⑩ from the relay pully ⑤.

*Note: When dismounting the gear ⑪, do not touch the flange ⓑ part. (Fig.D)

• Reassembling (Fig.II-21)

(1) Apply 1/2 drop of oil to the shaft ⑯. (Fig.F)
(2) Hook the timing belt(S) ⑩ to the joint gear ⑪, and then to the gear ⓓ of relay pully ⑤ (Fig.E).
(3) Attach the joint gear ⑪ to the shaft ⑯ with the timing belt(S) ⑩ attached.
(4) Turn the stopper ⑨ toward the Ⓒ direction until it comes to an end.
(5) Apply 1/2 drop of oil to the shaft ⑫. (Fig.A)
(6) Insert the loading lever ⑧ into the shaft ⑫. Then, match the ⓐ part with the claw ⑦ and insert the pin ⑬ into the groove of drive gear (right) ⑭.
(7) Secure the washer ⑥.
(8) Hook the timing belt(L) ③ to the gear as indicated in the Fig.B, and to the gear Ⓒ of the relay pully ⑤. (Fig.E)
(9) Mount the RC gear ② to the shaft ④ (with the timing belt(L) ③ attached). Then, mesh it with the RK gear ⑮.
(10) Secure the washer ①.
(11) Apply the grease to the position of loading lever ⑧ as indicated in Fig.C.
(12) In the same procedures "3-14" and "3-3", assemble the pinch sub arm and the capstan motor.

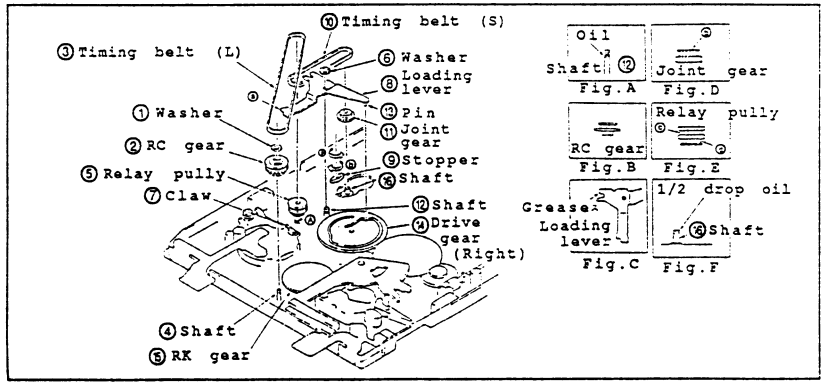


Fig.II-21

3-15 Relay Pully, TS Brake, LB Gear, RK Gear

• Disassembling (Fig.II-22)

(1) Set unloading state.
(2) In the same procedures in "3-3", dismount the capstan motor.
(3) In the same procedures in "3-13", detach the switch lever.
(4) In the same procedures in "3-14", detach the timing belt(L), the RC gear, the loading lever, the timing belt (S) and the joint gear.
(5) To take off the relay pully ②, remove the washer ①.
(6) To detach the TS brake ④, unhook the claw ③.
(7) Remove the spring ⑤.
(8) To detach the LB gear ⑦, remove the washer ⑥.
(9) Detach the RK gear ⑧.

*Note: When taking off the relay pully ②, do not touch the flange part ⓐ. (Fig.C)

• Reassembling (Fig.II-22)

(1) Apply the 1/2 drop of oil to the shaft ⑨. (Fig.A)
(2) Install the RK gear ⑧ to the shaft ⑨ longitudinally.
(3) Apply the 1/2 drop of oil to the shaft ⑩. (Fig.B)
(4) Install the LB gear ⑦ to the shaft ⑩. Then secure it with the washer ⑥.
(5) Put the spring into the shaft ⑪. Then, hook it to the notch ⑫, and cut-up part ⑬.
(6) Assemble the TS brake ④, and hook the claw ③.
(7) Apply the 1/2 drop of oil to the shaft ④. (Fig.D)
(8) Attach the relay pully ② to the shaft ④, and secure it with the washer ①.
(9) In the same procedures in "3-14", attach the timing belt(L), the RC gear, the loading lever, the timing belt(S) and the joint gear.
(10) In the same procedures in "3-13" and "3-3", install the switch lever and the capstan motor.

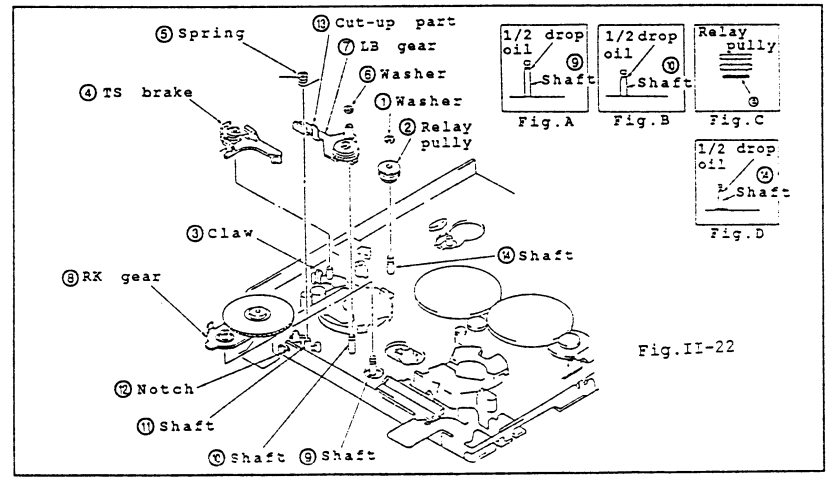


Fig.II-22

Fig.II-22

3-16 UL Gear, UL Brake, UL Arm, LB Plate spring

• Disassembling (Fig.II-23)

(1) In the same procedure in "3-13", detach the switch lever.
(2) To take off the UL gear ②, remove the washer ①.
(3) Detach the UL arm ③, the washer ④ and the LB plate spring ⑤.
(4) Take off the UL brake ⑥.

• Reassembling (Fig.II-23)

(1) Install the UL brake ⑥.
(2) Apply the 1/2 drop of oil to the shaft ⑦. (Fig. A)
(3) As shown in the Fig.B, attach the LB plate spring ⑤ to the shaft ⑦. Then, attach the washer ④.
(4) While matching the projection ⑧ with the groove ⑨ of UL brake ⑥, install UL arm ③ to the shaft ⑦.
(5) Attach the UL gear ② to the shaft ⑦. Then, mesh it with drive gear (left) ⑩.
(6) Secure it with the washer ①.
(7) In the same procedures in "3-13", install the switch lever.

*Note: To prevent the LB plate spring ⑤ damaging, do not secure the washer ① forcibly.

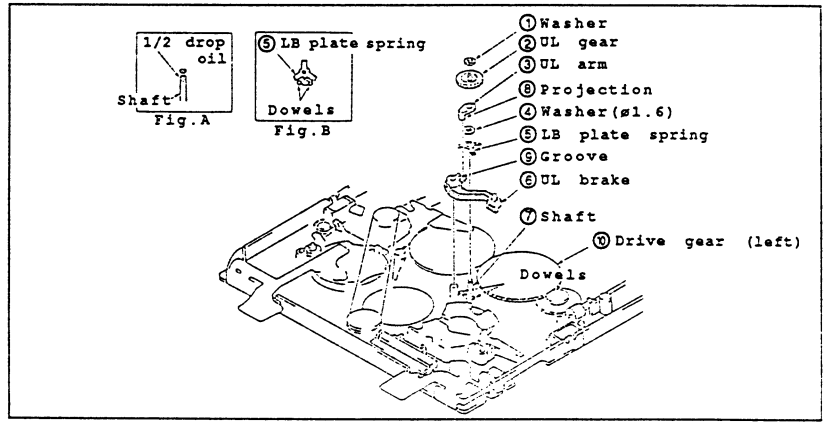


Fig.II-23

3-17 Coaster (Right), Drive Gear (Right)

• Disassembling (Fig.II-24)

(1) In the same procedures "3-3" and "3-12", dismount the capstan motor and the drum unit.
(2) In the same procedures in "3-14", take off the loading lever.
(3) Set STOP mode.
(4) To take off the coaster plate spring ② and the coaster (Right) ③, remove the screw ①.
(5) To detach the plate TT ⑤, remove the two screws ④.
(6) To dismount the drive gear (Right) ⑧, remove the washer ⑥ (ø1.5).

• Reassembling (Fig.II-24)

*Caution: Do not turn the tilt adjusting screw Ⓒ of coaster (Right).(Repair parts have been already adjusted.)

(1) Apply the grease to the indicated positions of chassis as shown in Fig.A.
(2) Apply the 1/2 drop of oil to the shaft ⑧. (Fig.F)
(3) Apply the grease onto the pin ⑨, the shaft ⑩ and the dowel ⑮ of coaster (Right) ③.
(4) Assemble the pin ⑨ and the shaft ⑩ aligning the slot ⑪ of chassis.
(5) Put the brake releasing arm ⑫ to the arrowed direction Ⓐ.
(6) Install the drive gear (Right) ⑦ to the shaft ⑧. Then. mesh it with the drive gear (Left) ⑬ while aligning each phases as shown in Fig.B.
(7) Align ⓐ with ⓑ, the hole ⑭ with the pin ⑨ of coaster (Right) ③, respectively.
(8) Secure the washer ⑥ (ø1.5).
(9) Assemble the coaster plate spring ② while aligning the shaft ⑩ (coaster ③) with the pin ⑨. Then, secure it with the screw ①. (Torque: 500g/cm approx).
(10) Assemble the plate TT ⑤ aligning with the dowel ⑮. Then, secure it with the two screws ④ in numerical order.
(11) Apply the grease to the positions indicated in the Fig.C and E.
(12) In the same procedures in "3-14", install the loading lever.
(13) In the same procedures in "3-12" and "3-3", mount the drum unit and the capstan motor.

*Note: After reassembling, perform the tape path adjustment.

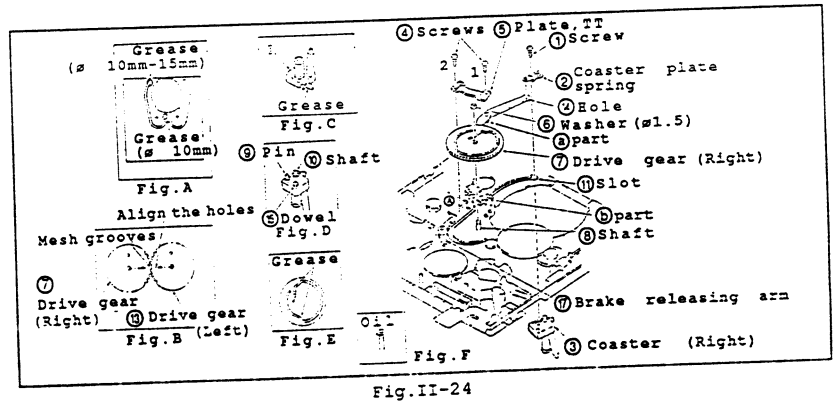


Fig.II-24

3-18 Coaster (Left), Drive Gear (Left)

• Disassembling (Fig.II-25)

(1) In the same procedures in "3-3" and "3-12", dismount the capstan motor and the drum unit.
(2) In the same procedures in "3-13" and "3-14", detach the switch lever, and the loading lever.
(3) In the same procedures in "3-17", detach the coaster (Right) and the drive gear (Right).
(4) To take off the coaster plate spring ② and the coaster (left) ③, remove the screw ①.
(5) To detach the plate SS ⑤, remove the two set screws ④.
(6) To take off the drive gear (Left) ⑦, remove the washer ⑥ (ø1.5).

• Reassembling (Fig.II-25)

(1) Apply the grease onto the indicated positions of chassis in the Fig.A.
(2) Apply the 1/2 drop of oil onto the shaft ⑧. (Fig.E)
(3) Apply the grease onto the pin ⑨, the shaft ⑩ and the dowel ⑯ of coaster (Left) ③.(Fig.B)
(4) Assemble the pin ⑨ and the shaft ⑩ aligning the slot ⑪.
(5) Insert the driver gear (Left) ⑦ into the shaft ⑧ while meshing with the wheel gear ⑫ and the UL gear ⑬.
(6) Align ⓐ part with the slot ⑪, and the hole ⑭ with the pin ⑨ of coaster (Left) ③.
(7) Secure it with the washer ⑥ (ø1.5).
(8) Install the coaster plate spring ② while aligning the shaft ⑩ and the pin ⑨ of coaster (Left) ③. Then, secure it with the screw ①. (Torque: 500g/cm, approx)
(9) Attach the plate SS ⑤ while aligning with the dowel ⑮. Then, secure it the two screws ④ in numerical order.
(10) Apply the grease onto the positions indicated in the Fig.C and D.
(11) In the same procedures in "3-17", install the coaster (Right) and the drive gear (Right).
(12) In the same procedures in "3-14" and "3-13" install the loading lever and the switch lever.
(13) In the same procedures in "3-12" and "3-3", install the drum unit and the capstan motor.

*Note: After reassembling, perform the tape path adjustment.

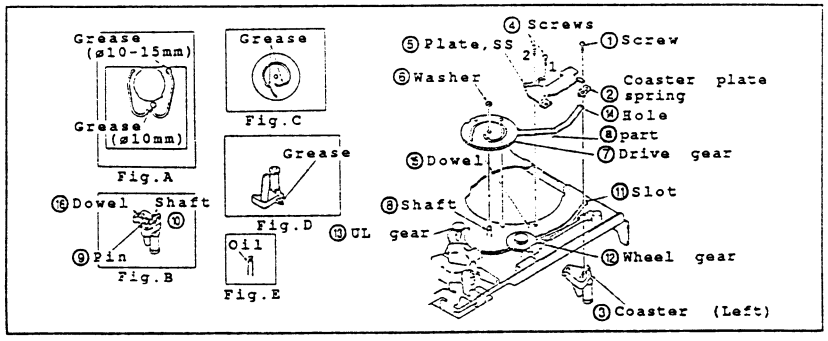


Fig.II-25

3-19 Loading Motor, Worm Assembly, Wheel Gear, Brake Releasing Arm

• Disassembling (Fig.II-26)

(1) In the same procedures in "3-3" and "3-13", dismount the capstan motor and the switch lever.
(2) In the same procedures in "3-14", detach the loading lever.
(3) In the same procedures in "3-17" and "3-18", detach the drive gears (Right) and (Left).
(4) To dismount the loading motor ②, remove the two screws ①.
(5) Take off the brake releasing arm ③.
(6) To take off the wheel gear ⑤, remove the washer ④.
(7) Unhook the six claws ⑦ of worm a'ssy..

• Reassembling (Fig.II-26)

(1) Install the worm a'ssy ⑥ while hooking the six claws ⑦.
(2) Apply the grease to the five shadow areas of worm a'ssy indicated in the Fig.A.
(3) Apply the 1/2 drop of oil to the shaft ⑧. (Fig.B)
(4) Insert the wheel gear ⑤ into the shaft ⑧, and mesh it with the worm a'ssy's gear.
(5) Assemble the brake releasing arm ③.
(6) Apply the grease onto the entire surface of loading motor gear part.
(7) Align the loading motor ② with the chassis. Then, secure them with the two screws ②.
(8) In the same procedures in "3-18" and "3-17", install the drive gears (Left) and (Right).
(9) In the same procedures in "3-14", install the loading lever.
(10) In the same procedures in "3-13" and "3-3", install the switch lever and the capstan motor.

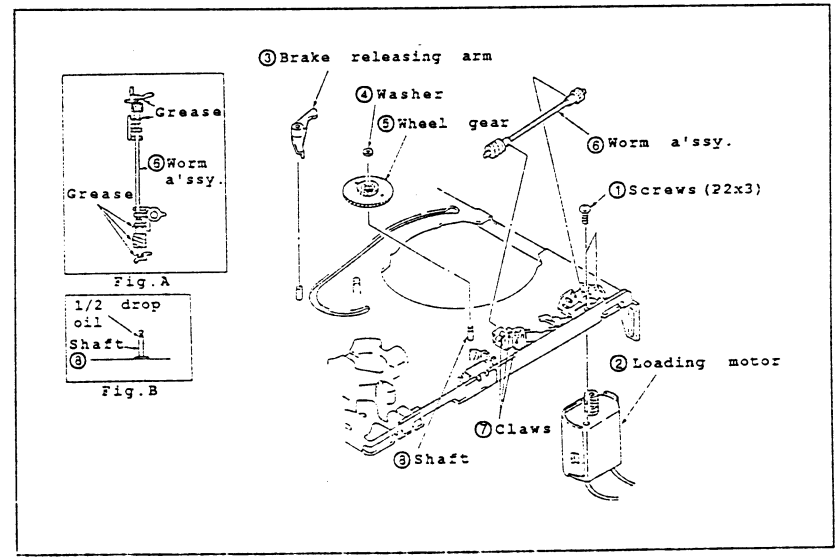


Fig.II-26

3-20 Rotary Upper Drum

• Disassembling

Note: If recordable, perform recording before disassembling.

(1) Unsolder three solderings ⓐ. Then, confirm that the terminals which come out from the hole of C.B.A. can be moved freely. (Fig.II-27)
(2) Remove the two setscrews ①.
(3) Secure the jig ④ to the drum with the two setscrews ②. (Setscrews supplied with jig ④ as a set.) Then, screw in the hexagonal bolt ③ into the hole of jig ④ to dismount the rotary upper drum ⑤. (Fig.II-28)

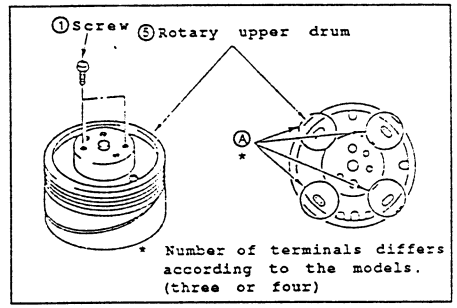


Fig.II-27

• Reassembling

(1) Clean the flange surface and the rotary upper drum ⑤ surface which faced the flange surface. Check that there is no dust particles and flaws.
(2) Insert the jig ⑦ into the drum positioning holes of upper/lower rotary drum. (Fig.II-29)

*Note: At this time confirm that the terminals ⑧ come out from the holes of the rotary upper drum C.B.A..

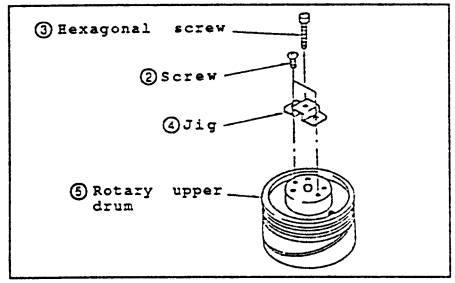


Fig.II-28

(3) Pull out the jig ⑦, and then push the rotary upper drum ⑤ into the lower one manually and gently. If it cannot be set completely to the bottom, Tighten the two setscrews ① alternately and temporarily. (Fig.II-27)
(4) Insert the jig ⑦ into the positioning holes ⑥ again.If it cannot be inserted smoothly, loosen the two setscrews ①. Then perform the step (3) of disassembling procedure.
(5) Tighten the two setscrews ① thoroughly.
(6) Solder the terminals ⓐ. (Fig.II-27)

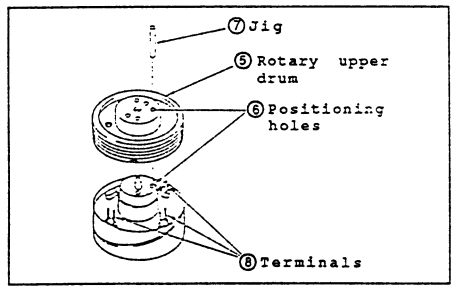


Fig.II-29

*Notes: 1. When soldering, be careful not to let the solder flow to the C.B.A..
2. After reassembling, perform the tape path adjustment.

3-21 Tension Regulator Position Adjustment (Fig.II-30)

(1) Set the cassette tape, and set it to PLAY mode.
(2) Check that the distance between ⓐ part of tension regulating arm ① and the groove ② of chassis is within 1.1 ± 0.3mm. If it is not the specified distance, perform the following adjustment (from step (3)) without the cassette tape.
(3) Loosen the screw ④ of tension regulating plate ⑤.
(4) If the distance measured in step (2) is more than specified, slide the plate ⑤ in the direction of arrow Ⓐ. If it is less than the specified slide it in the direction of arrow Ⓑ. After sliding, secure it with the screw ④.
(5) For checking, perform the steps (1) and (2).

*Notes: 1. Use the cassette tape which is forwarded to about the middle section.
2. The trail of left coaster on the groove ② of chassis: 1.1mm(approx.)

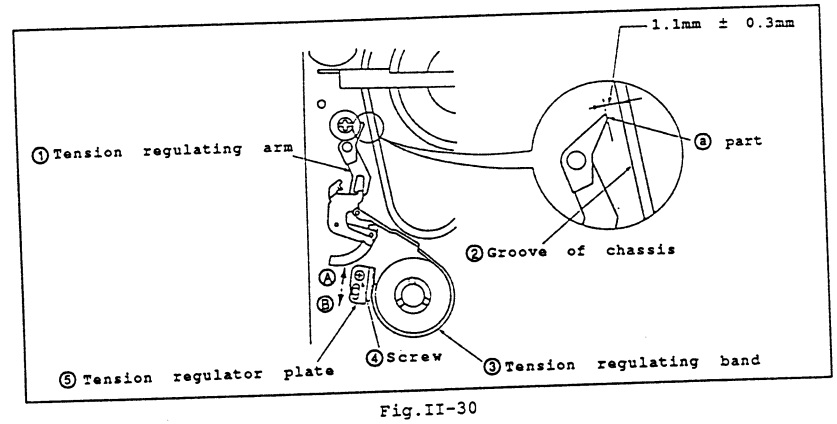


Fig.II-30

3-22 Back Tension Adjustment (Fig.II-31)

(1) Set the cassette torque gauge (DY9-1047-000)
(2) Set PLAY mode. Confirm that the torque at S reel table is 9-13 g/cm.
(3) If not, adjust the adjust arm ①.

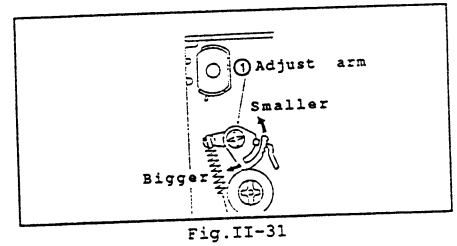


Fig.II-31

3-23 T Reel Table Torque Check

(1) Set the cassette torque gauge (DY9-1047-000)
(2) Set PLAY mode. Confirm that the torque at T reel table is 7-15 g/cm.
(3) Set REV mode. Confirm that the torque at T reel table is 13-25 g/cm.

4. Tape Path Adjustment

(Notes for No.7 Guide only)

As the height adjusting screw for No.7 guide is located apart from the No.7 guide . So, to adjust the No.7 guide while watching the state of tape, modify the cassette tape as shown in the Fig.II-32.

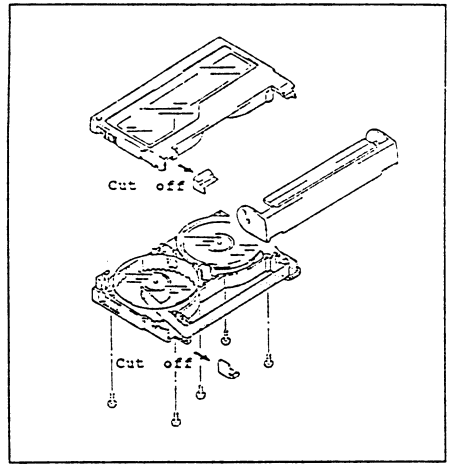


Fig.II-32

4-1 Preparation for Adjustment

*Caution: 1. Do not turn the tilt adjusting screw of the coaster (Right). Replace it if any adjustments required.The repair parts have been already adjusted.

(1) Clean the tape running surface.
(2) Referring to the service manuals for each system, observe the RF envelope signal and RF switching pulse on oscilloscope.
(3) Playback the Alignment tape for tracking.
(4) Confirm that the waveform at inlet and outlet sides are flat. If not, perform the following adjustments from page 46.

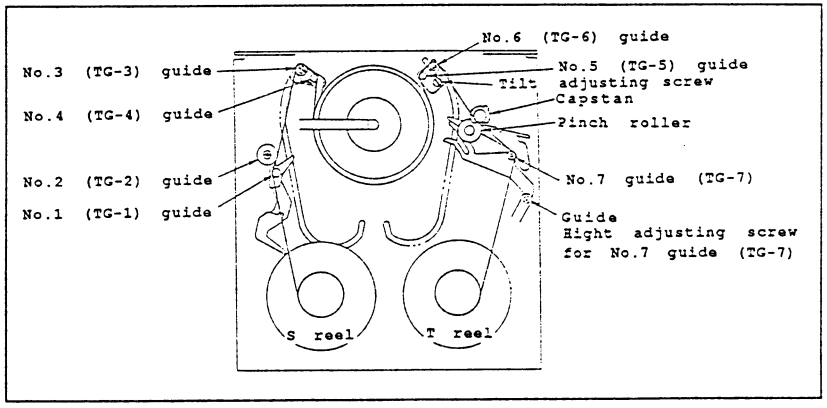


Fig.II-33

4-2 Tracking Adjustment (Fig.II-34)

(1) Playback Alignment tape for tracking adjustment.
(2) Loosen the screw ② a little by inserting a hexagonal wrench (0.89mm) or equivalent into the hole ①.
Then, turn the No.3 guide ③ to make the waveform at inlet side flat.
(3) Loosen the screw ⑤ a little by inserting a hexagonal wrench (0.89mm) or equivalent into the hole ④.
Then, turn the No.6 guide ⑥ to make the waveform at outlet side flat.

*Note: Be careful not to loosen the screws too much because the guide will be easily moved.

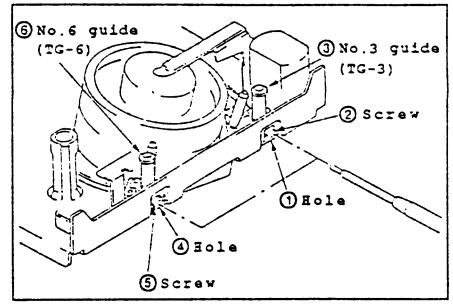


Fig.II-34

4-3 Tracking Fine Adjustment (Fig.II-35)

(1) Referring to the service manuals for each system, set it to the track shift made.(70 %)
(2) Confirm that the waveform is flat. If not, turn No.3 and 6 guides to make it flat.
(3) Tighten the screw ② of No.3 guide to lock it. At this time, confirm that the inlet side of waveform is not changed. (Fig.II-34)
(4) Tighten the screw ⑤ of No.6 guide to lock it. At this time, confirm that the outlet side of waveform is not changed.(Fig.II-34)

*Note: Torque at Screws ②, ⑤: 200g/cm approx.

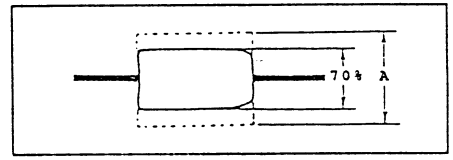


Fig.II-35

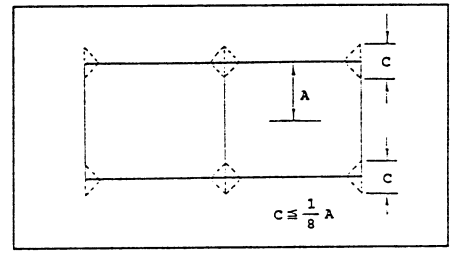


Fig.II-36

4-4 No.2 Guide Adjustment

*Note: When turning or replacing the No.2 guide, perform the following preset procedures before adjustment.

4-4-1 No.2 Guide Presetting

• To preset, adjust the distance between the surfaces of mechanical chassis and TG2 upper flange ① to 18.6 mm by turning TG2 upper flange ①.

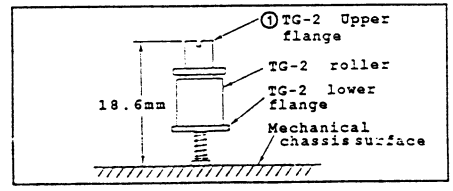


Fig.II-37

4-4-2 No.2 Guide Adjustment (Fig.II-38, 39)

(1) Playback the tape having 10μm in thickness (P6-120 etc.). Then, set it to REV mode.
(2) Confirm that the tape is not creased at the lower flange ② of No.2 guide ①. If creased, turn the upper flange ③ of No.2 guide ① clockwise until the crease removed.
(3) Playback the Alignment tape for tracking adjustment.
(4) In the same procedures in "4-2" and "4-3", perform the tracking and tracking fine adjustments.
(5) At track shift mode, playback the tape after CUE/REV mode. Confirm that the RF envelope rises horizontally within 2 sec as shown in Fig.II-40.
(6) If not, turn the upper flange ③ of No.2 guide ① counter clockwise by 90°.
Then, perform the step (5) again.

Repeat the steps (5) and (6) until the normal waveform as specified is obtained.
When the RF envelope changed at this time, perform the tracking fine adjustment for inlet side.
Then, perform the step (5).

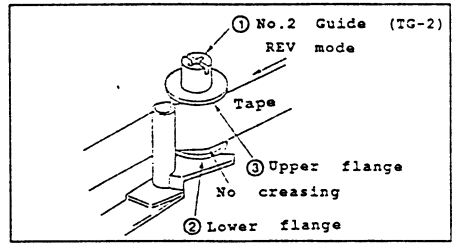


Fig.II-38

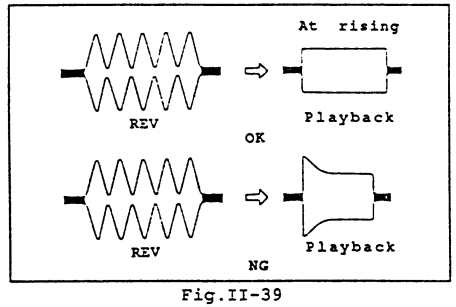


Fig.II-39

4-5 No.7 Guide Adjustment (Fig.II-40)

(1) Playback the tape having 10μm in thickness (P6-120,etc.). Then, set it to REV mode.
(2) Confirm that the tape between the No.6 guide ① and the capstan ② is not loosened. If loosened, turn the height adjusting screw ④ of No.7 guide ③ to remove it.
(3) Set it to PLAY mode. Then, confirm that the tape between the capstan ② and the No.7 guide ③ is not loosened (0.5mm or less).

If not (more than 0.5mm), turn the height adjusting screw ④ of No.7 guide ③ until the rating is obtained.
(4) Set it to REV mode again. Confirm that the tape loosening between the No.6 guide ① and the capstan ② is 0.3mm or less.

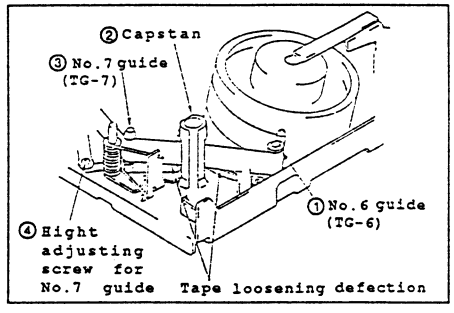


Fig.II-40

4-6 Checks after Adjustments

*Note: If the following ratings cannot be obtained, perform the tracking, tracking fine, No.2 guide and No.7 guide adjustments, respectively.

4-6-1 Tracking Check (Fig.II-41)

(1) Set it to the track shift mode. Confirm that the amplitude of RF envelope is 70% approx.
(2) Confirm that the minimum amplitude (E MIN) is 65% or more of the maximum (E MAX).
(3) Confirm that the waveform has no variations.

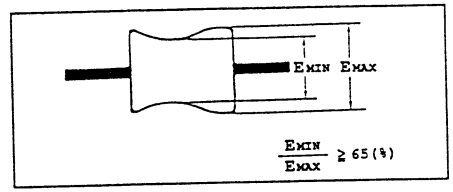


Fig.II-41

4-6-2 CUE/REV Waveform Check (Fig.II-42)

(1) Playback the alignment tape for tracking adjustment. Then, set it to REV mode.
Confirm that the tops between each waveform remains stable and equal within 5 sec.
(2) Set it to CUE mode.
Confirm that the tops between each waveform remains stable and equal for mor than 5 sec.

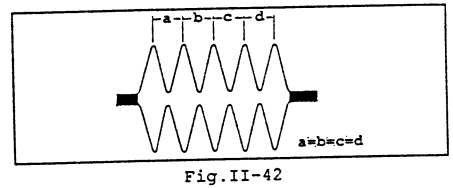


Fig.II-42

4-6-3 Rise Time Check

(1) Playback the alignment tape for tracking adjustment.
(2) After ejecting the tape once, playback it again.
(3) Confirm that the RF envelope rises horizontally within 2 sec. Also, check that the tape is not loosened around the pinch roller.
(4) After set it to CUE/REV and FF/REW, playback it again.
Confirm that the RF envelope rises within 2 sec. horizontally.
Also, check that the tape is not loosened around the pinch roller.
(5) Repeat check procedures from (2) to (4) again.

4-6-4 Tape Movement Check (Fig.II-43)

(1) Playback the cassette tape having 10μmm in thickness (P6-120 etc.).
Confirm that the tape at each guide as indicated in the Fig.II-44 is not deflected or curled. (less than 3mm acceptable).
(2) Set it from PLAY to CUE. Then, set it from PLAY to REV.
Confirm that the tape at each guide is not also deflected or curled. (less than 0.3mm acceptable).

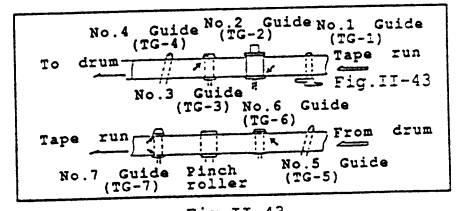


Fig.II-43